Step 3 - Current Conditions

Introduction - This step describes the current range, distribution, and condition of ecosystem elements. It is organized by issue as presented in Step 2, and answers Key Questions identified for each issue of this step.

Aquatics

Hillslope Processes

Key Question #1 - What are the dominant climatic and hydrologic characteristics and processes of this watershed?

Climate

The Lower Scott Analysis Area encompasses an area of steep mountain topography with high relief in the central and eastern Klamath Mountains. Climate in this area is a mixture of effects from the Pacific Ocean and interior climatic processes. Climate is characterized by a warm, dry season from May to October and a wet winter dominated by rainfall from cyclonic storms off the Pacific Ocean. The large storms that have produced major flooding and landslide damage have occurred early in the winter, from November to early January.

The upper elevations of the analysis area receive snowfall during the winter. The zone of snowfall can be divided into two areas that have implications for erosional processes: an upper elevation area, generally covered with snow pack the entire winter, and a lower zone, generally 4,500 to 5,500 feet, that alternately experiences snowfall and rainfall. The higher elevation snow-covered zone generally does not have severe erosion problems. The lower transitional zone, or rain-on-snow zone, can experience intense erosion. When warm rain falls on a pre-existing snow pack, the rain melts some of the snow and produces a greater volume of runoff than rainfall alone could produce. All of the major floods in recorded history: 1861, 1955, 1964, 1974, and 1997, and the accompanying damage, have resulted from rain-on-snow events to some degree.

Summer thundershowers can also cause erosional effects; however, to a lesser degree. Summer thundershowers are generally isolated cells over the higher mountains. They are sometimes intense enough to create erosion effects and damage is usually localized. For example, on June 1, 1986, a thundershower occurred in the lower part of Tompkins Creek. It created increased stream flow and sediment deposition in several small ephemeral drainages, which resulted in $15,000 damage to Forest Road 46N64 by plugging culverts. Some summer thunderstorms have been extensive enough to turn the Scott River turbid for several days; however, they generally do not produce turbidity in the entire watershed. In particular, during the summer of 1999, several thundershowers turned Moffett Creek very turbid, which in turn created turbidity in the Scott River. The fine sediment deposited in mainstem Scott impaired visibility for several weeks. During some of these events over the last 15 years, dredgers at Scott Bar have reported that they have not been able to dive for several days, due to reduced visibility in Scott River.

One process that has occurred several times in the area, and never mentioned in geomorphologic literature, is a summer thundershower in late May or June of a heavy snowfall year. These storms are intense rainfalls on slopes that are covered with snow and/or saturated from recent snowmelt. This has occurred twice in the Lower Scott area. On the Memorial Day weekend of 1983, after the heaviest snowfall year of record, a summer thundershower in the upper part of Tompkins Creek created a landslide and debris flow known as the Tompkins Memorial Slide. Another example occurred in the upper part of Boulder Creek on a steep debris slide at about 6,000-foot elevation formed in glacial till. This debris slide has failed several times in the last 15 years, due to summer thundershowers, the high elevation, and late season snow pack or snowmelt saturated slopes.

Precipitation

Annual precipitation during the period of record (1936 to present) at Fort Jones ranges from 10 inches to 35 inches, with an average annual of about 22 inches. However, Fort Jones is a low-elevation station in the middle of a large valley. Average precipitation within the Lower Scott area is greater, but there are no measuring stations.

Of the year's precipitation, 90% normally occurs in the winter period of November to April. Etna receives more precipitation during the winter because of its proximity to tall mountains.

The historical precipitation record is characterized by alternating periods of wet and dry that last for a few years to a few decades. The longest nearby rainfall record is at Yreka, where records exist from 1859 to the present. Wet and dry trends are evident.

Areas above 5,500 feet in elevation are generally covered with snow from late November until late May or June. Snow depth and water content is measured at one station, Box Camp Ridge, previously called Marble Valley. Water content of the snow pack usually peaks around April 1. The seasonal extent, depth, and water content of the snow pack vary year to year. The California Department of Water Resources uses these data to predict April to June snowmelt runoff. As the snow pack melts, a noticeable increase in stream discharge is created. The flow of the main stem Scott River through the analysis area is dramatically affected by the amount of snow pack in the upper part of the Scott River basin. This determines spring and summer discharge in the entire Scott River and, consequently, affects aquatic conditions. Spring snow runoff is generally not large enough to create erosion problems.

Hydrology

There is significant year-to-year variability in the total volume of discharge in the Scott River. Ranges of discharge include a high of 1,083,000 acre-feet in water year 1974 to a low of 54,200 acre-feet in water year 1977. Flow levels in the Scott River, and the resulting aquatic conditions, are very different between these wet and dry years. During the dry years, portions of main stem Scott River, just above the analysis area, go completely dry.

There are several patterns of runoff apparent from these data. The years 1990, 1991, 1992, and 1994 were very dry, and the Scott River never significantly increased in discharge, even in the winter. The normal increase in the hydrograph from melting snow in April to June is not evident. Basically, these are drought years that probably have negative effects on aquatic resources, especially in main stem Scott River. In some of these dry years, the minimum stream flows in the Scott River Adjudication (as defined at the United States Geologic Survey (USGS) gage) are not being met, even in the fall months.

Water discharge levels typically rise in November to late December in response to fall rains; peak discharge in January and February in response to large winter storms; a slight decrease in late March or early April as storms decrease and temperatures remain low; an increase in April to June from snowmelt; and a rapid decrease in discharge in June to August as snowmelt diminishes and storms have ceased. It is also evident that in every year, regardless of whether the winter was wet or dry, summer flow levels decrease to very low in August to September. This is in response to a combination of natural and man-made situations: hot days with no precipitation and intensive use of water for agriculture in Scott Valley.

The pattern of discharge for 1997 is very different than normal, and similar to the severe winters of 1955, 1964, and 1974. There is a very large peak of discharge, in response to warm rainstorms that occurred early in the season. The peak is earlier and much greater than rainstorms in other average or above average years. This pattern of early storms and large discharge has occurred in the years that produced major landsliding in northern California in 1964, 1974, and 1997. Storms in late December and early January also produced intensive landslide and erosion damage in this analysis area.

Key Question #2 - What are the dominant erosional characteristics and processes in this watershed?

Dominant erosional processes

Steep mountain terrain that experiences periods of intense rainfall is subject to landsliding and surface erosion. Geologically this has always been a geomorphic process in Lower Scott, as evidenced by landslide deposits all across this area. However, many of these deposits probably formed in a previous climatic era that was warmer and wetter than our current climate.

Overall, landsliding and surface erosion are the dominant erosional processes. Landsliding occurs episodically in response to large storms and produces large volumes of sediment in single pulses. Intense storms with a return period of 10 to 20 years (or more) can produce huge increments of sediment in a matter of a few hours

Landslides and landslide deposits occur naturally and have been accelerated by human activities. Human activities that create the highest risk of landsliding are roads, timber regeneration harvest (especially on steep slopes), and hot burn intensity on steep slopes. The most severe risk of slope failures occurs when all three factors exist on the same slope. The upper slopes of Tompkins Creek burned hot in the 1987 wildfires. Salvage logging took place in 1988 and 1989 along the three existing roads across the slope. In the 1997 storms, a large number of debris slides and deep-seated slides occurred in this area. Some of these landslides moved down slope into stream channels creating debris flows that scoured the main channel of Tompkins to its mouth. The upper slopes and main channel of Tompkins Creek have been de-stabilized and it will take several decades for them to reach equilibrium.

Geomorphic Terranes

The Lower Scott analysis area is a portion of the steep and rugged Klamath Mountains. The Scott River canyon cuts through these mountains. The bedrock geology consists of metamorphic rocks that have been intruded by granitic and ultramafic rocks. A major geologic fault traverses the middle of this landscape, with differing geologic units on either side of the fault. The geomorphology of this area is very complicated, although, overall the area can be characterized as steep and mountainous, where landslide and erosion processes play a key role. There are at least six separate geomorphic landscapes in the Lower Scott Analysis Area that have different characteristics and respond to management in different ways: 1) steep mountainous terrane, 2) moderately steep mountainous terrane with extensive areas of ancient landslide deposits, 3) granitics, 4) ultramafics, 5) moderate slopes with few landslide deposits, and 6) higher elevation glaciated terrane. A description of these geomorphic landscapes follows.

1) Steep, Mountainous Terrane

This is the highest landslide risk area where landslides are common, occurring typically as debris slides and debris flows. Slopes are very steep, commonly 65% or greater. During heavy storms, large deep-seated landslides and/or debris slides can occur. Sometimes, these slope failures move downslope into stream channels and combine with fluvial discharge to form debris flows. Debris flows that move down the stream channel have a catastrophic effect on the channel. The best examples are the slides that occurred in the upper part of Tompkins Creek during the 1964 flood. This terrain is also subject to road failures, especially where the road crosses landslide toe zones.

2) Moderately Steep Mountainous Terrane With Extensive Areas of Ancient Landslide Deposits

These areas have less landslide risk than steep, mountainous terrane. The slides that occur here tend to be smaller slow moving slumps and earthflows. Roads in this terrane are subject to erosion and small cut bank failures. Good examples of these erosional processes are the slump/earthflows that occurred along Road 45N42Y during the 1983 storms. That extremely wet year created several slides along the road that took out a portion of the road prism.

3) Granitics (Slinkard Creek Pluton)

This geomorphic terrane typically has few large landslide deposits, some small debris slides, and surface soil erosion, but not as severe as other KNF areas. Overall, the granitic terrane does not have the frequency of large or severe landslides that occur in the metamorphic rocks. Surprisingly, the lower elevation portion of the granitic terrain, centered around the lower reaches of Kelsey and Middle Creeks, has few landslides. The upper elevation portion of the granitics in the East Fork of Tompkins Creek has a few large steep debris basins.

4) Ultramafics

Ultramafic terrane is characterized by nutrient-deficient soil and stunted vegetation. It consists of old deep-seated landslide deposits, which are generally dormant en masse, but steep toe zones can be activated during storms.

5) Moderate Slopes With Few Landslide Deposits

This terrane typically has some surface erosion problems, but is generally low landslide risk for management activities. During storms, few if any landslides of any size occur. However, stream flooding can be an issue, especially for roads that are within the floodplain. Lower Mill Creek is an example of an area with this type of geomorphology.

6) Higher Elevation Glaciated Terrane

The topography in this terrane is shaped by glacial scour and till deposits. There is generally moderate to gentle slopes with, overall, very few large, catastrophic landslides. An exception is the glacial till located on the east side of Boulder Creek. It is on a very steep slope and fails as a debris slide during winter rainstorms or summer thundershowers. The stream channels in this terrane are subject to debris flows during rain or rain-on-snow events.

Key Question #3 - What effects have recent extreme floods had on watershed conditions and erosional processes in these watersheds

Within historic times, there have been a number of large, damaging storms in this landscape. The years 1955, 1964, 1974, and 1997 were all winters with large rainstorms that produced damaging landslides. December 1964 was the largest of these storms. The intensity of this storm was due to a rain-on-snow event. Other storms, including 1997, had rain-on snow components, but 1964 had a large snow pack in early December, followed by several weeks of warm, tropical rain that produced a large volume of runoff. The 1964 storm had a profound effect on upslope and channel conditions in this landscape. Many stream channels are still recovering from 1964 debris flows.

The 1997 storms, approximately a 25-year event, produced extensive flooding, erosion, and landslides in Lower Scott. This resulted in extensive damage to the road system as a result of plugged culverts, erosion of the road surface and road fill, and landsliding. The most extensive damage in the analysis area, and on the KNF, occurred on the steep slopes in the upper part of Tompkins Creek. Most of the catastrophic landslides occurred on steep slopes that had previously been timber harvested and/or burned hot during the 1987 fires. Some landslides damaged several roads so severely that they will not be reopened. These slides moved downslope into Tompkins Creek creating catastrophic debris flows that scoured the channel and completely removed the crossing on Road 46N64. The only positive note from the effects are that these debris flows deposited material in the Scott River, including gravel that is now being using by salmon for spawning in the fall.

The Canyon and Kelsey Creek drainages also experienced damage from the 1997 storms, but not as extensively as Tompkins Creek. Damage was scattered throughout these drainages and was a mixture of plugged culverts, scour of the road fill, slumps of the road prism, and scour of crossings due to debris flows. The single largest road failure site on the KNF is the large slide on Road 44N45 just past the crossing of Kelsey Creek. This slide is a debris flow that scoured the crossing and undercut the adjacent steep slopes, creating debris slides on either side. The result was a small canyon that required a huge rock fill to be able to re-establish the road prism. In another interesting road failure, a slump/fill failure on the Box Camp Ridge Road turned into a debris flow in a very small channel and then moved down this channel to scour out three road crossings. The road damage was scattered throughout these drainages and is primarily related to unstable geology and/or poor road design.

Key Question #4 - What parts of the watershed are considered AWWCs in the Forest Plan, and what additional areas will be evaluated in this process? What parameters are used to make this determination?

The Record of Decision for the Forest Plan identifies AWWCs across the KNF. AWWCs represent drainages where cumulative watershed effects are a special concern due to a combination of high disturbance levels (roads, harvest, fire, etc.), potential for landsliding, surface erosion, and degraded aquatic conditions. An AWWCs determination puts restrictions on additional land-disturbing activities, specifically timber harvest, on the NFS lands until an analysis of the watershed is completed. Forest Plan AWWCs were determined along compartment boundaries, which do not correspond well with the seventh field subwatershed delineations, used for this watershed analysis. AWWCs within the Lower Scott seventh field subwatersheds include the west half of the Tompkins Creek subwatershed, most of the Deep/Middle subwatershed, and the northern half of the Kelsey Creek subwatershed (see Figure 3-2).

The strategy for a watershed-scale review of AWWCs is to re-evaluate all subwatersheds including those that overlap Forest Plan AWWCs. Watershed conditions, processes, and functions are examined for all subwatersheds, and recommendations are made for future management. Determination through watershed analysis that an area has watershed concerns is not a planning decision. The determination advises managers that a subwatershed may not meet Aquatic Conservation Strategy (ACS) objectives if additional land disturbance occurs. Future analyses will determine the state of recovery for those areas with cumulative watershed effects concerns.

Acres of timber harvest, acres of wildfire, and roaded acres are displayed in Table 3-1, Watershed Disturbance Summary, for each analysis subwatershed. Watershed disturbances are also displayed in Figure 3-3, Watershed Disturbances, contained in the map packet located at the end of this document.

The timber harvest acreages reported consist of intensive harvest areas derived from the Forest's Existing Vegetation Layer, using plantations from regeneration harvest. In Table 3-1, harvest is grouped into five categories, based on the year harvested. Harvest acreages include NFS lands only, and do not include timber harvest that may have occurred on private lands. Generally, harvest recovery becomes significant after about twenty years and nearly recovered after forty years. In the analysis area, the oldest plantations originated in 1958.

Wildfire acreage reported in Table 3-1 is from the burn intensity mapping of the 1987 fires. Only moderate and high burn intensity acreage is counted. Older fires, before 1987, are considered recovered in this analysis. Fire burn intensity mapping occurs across land ownership patterns.

Roaded acres are based on a road prism width of 12 meters, or 39.17 feet. This width was chosen based on average road widths by slope class and engineering standard schematic road prism profiles. It is also similar to the 40-foot width used in the Salmon Sediment Analysis (de la Fuente and Haessig, 1994), on which mass-wasting coefficients were based. Roads acreages displayed in Table 3-1 encompass all roads in the analysis area. Included are roads extending into private lands and roads under County, State, and private jurisdiction.

Watershed disturbance acreages were calculated chronologically, with the most recent disturbance "masking" older disturbances in the same area. In addition, roaded acres mask all other disturbances;

therefore, areas are not double-counted. For example, areas burned in the 1987 fires, then salvaged and planted, are not counted as wildfire acreage but are counted as 1988 to 1994 intensive timber harvest.

Table 3-1. Watershed Disturbance Summary.

Subwatershed Name	Total Acres	Acres Undisturbed	Acres Harvested 1958-1967	Acres Harvested 1968-1977	Acres Harvested 1978-19887	Acres Burned 1987 Fires	Acres Harvested 1988-1994	Acres Harvest 1995-1998	Acres of Roads
Boulder/Indian Scotty	8,688	8,133	-	114	8	-	256	-	178
Kelsey Creek	11,429	9,907	236	18	44	621	492	16	94
Deep/Middle	8,204	6,283	145	231	250	611	472	48	165
Upper Canyon Creek	5,136	5,088	26	-	-	-	16	-	7
Red Rock Creek	4,124	4,124	-	-	-	-	-	-	-
Lower Canyon Creek	6,545	6,031	170	23	49	-	164	-	108
Tompkins Creek	9,321	6,827	4	236	219	812	1,049	-	173
Townsend/ McCarthy	11,612	11,328	-	80	-	6	41	7	151
Big Ferry/McGuffy	7,636	7,398	-	18	34	-	-	-	187
Franklin/Muck-a-Muck	6,447	6,390	-	-	-	-	-	-	58
Upper Mill Creek	7,217	6,848	-	42	60	-	38	-	229
Lower Mill Creek	7,091	6,798	-	16	55	-	27	-	195

Riparian Areas

Key Question #1a - What are the current vegetative conditions of riparian and stream areas?

Vegetation within the interim RRs is characterized using the Ecological Unit Inventory (EUI) for the area. The EUI contains detailed information on vegetation seral stage, canopy closure, tree species present, soil types, Potential Natural Vegetation (PNV), and several other attributes over the mapped area (refer to Appendix-H, EUI Defined). The existing vegetation for the analysis area is constructed from the PNV, primary and secondary species. Vegetation in the RRs is described using the existing vegetation.

The existing vegetation in the analysis area has been divided into twelve distinct types. To describe RR vegetation, these types are re-grouped as mixed conifer/hardwood stands on good site; mixed hardwood/conifer stands on harsh site, and riparian/meadow types. Good sites are capable of supporting dense stands of trees that provide shade to streams and sources of large woody material. Without intensive disturbance (such as high intensity wildfire or timber harvest), these sites should be dense (greater than 60% tree cover) and dominated by late-seral stages (mid-mature to old-growth). Mixed conifer stands on harsh sites, as defined by soil type, may not be capable of growing dense stands of large trees.

Riparian types contain riparian or meadow vegetation communities. For the RR vegetation analysis, riparian types consist of the following plant communities; willow, aspen, montane meadow, and mixed conifer riparian types with alder, yew, cottonwood, maple, and dogwood. A compilation of these vegetation types in the mapped RRs is displayed in Table 3-2, Vegetation Classification in Mapped RRs, and Figure 3-4 RR Vegetation contained in the Map Packet located at the end of this document.

Table 3-2. Vegetation Classification in Mapped RRs.

Vegetation Classification	Acres	% Of Good Site	% Of RR
Good Site, Mixed Conifer/Hardwood			
Early-Seral, <60% tree	3,037	17	16
Early-Seral, >60% tree	3,193	18	17
Late-Seral, <60% tree	2,613	15	14
Late-Seral, >60% tree	8,721	50	44
Subtotal	***17,564***	***100***	***91***
Harsh Sites	981	---	5
Riparian Types	757	---	4
Subtotal	***1,738***	***0***	***9***

TOTAL	19,302	---	100

Key Question #2 - What are the current stream channel characteristics and aquatic species habitat conditions?

The physical structure of streams plays a primary role in determining the suitability of aquatic habitats. Structural elements are created through interactions between natural geomorphic features, sediments, woody material, and the power of flowing water. These elements give rise to a variety of habitat attributes that are used by various life stages of aquatic-dependent species. Habitat attributes include substrate composition, amount of shade, pool size, and frequency, and other parameters that are measured or visually estimated. The condition of some of the primary attributes of aquatic habitats in Lower Scott area streams are discussed below and compared to reference values in Step 5.

Stream habitat and riparian surveys have been widely used to describe and quantify the physical characteristics of streams. Stream surveys in the Lower Scott analysis area began as spot checks in the 1930s and became more comprehensive and quantitative through time. Many of the larger streams, generally second to fourth order, have been surveyed in the 1980s and 1990s. Most recent surveys used Region 5 Stream Condition Inventory (SCI) protocol. This information has been used for assessing the existing condition of aquatic species habitat. Smaller (zero to first order) streams have not been surveyed.

Low gradient areas are depositional areas, and are often some of the most productive areas in regard to aquatic processes. The Lower Scott area contains very little low gradient habitat (less than 2%). Sections of low gradient habitat are found in the mainstem Scott River, but virtually none in the tributaries. Most channel types are Rosgen A and B. In contrast, just upstream of the analysis area low gradient habitat becomes the dominant type in the mainstem Scott and in portions of the larger tributaries.

For this analysis, streams were grouped into managed streams and reference streams. Reference stream information, taken from unmanaged, unroaded, and wilderness streams, is presented in Table 5-9 Reference Habitat Components in Step 5. Managed streams are used here to describe current condition. Primary components of aquatic habitats included in this analysis are pool frequency - the ratio of pools (slow water) to runs and riffles (fast water); maximum pool depth; canopy cover (shade); large woody debris; and substrate composition. Table 3-3, Average Fish Habitat Parameters, displays values of primary habitat components for surveyed managed streams within the analysis area. The flood of January 1997 caused high flows in most streams in the analysis area. These flows may have changed some of the stream habitat parameters recorded in earlier surveys. All managed streams reported in this analysis were re-surveyed after the 1997 flood. More detailed quantitative and qualitative information on streams in the assessment area can be found in Appendix-C Aquatic Habitat.

Table 3-3. Managed Stream Average Fish Habitat Parameters.

Stream	Reach Length (meters)	% Substrate Composition 1/					% Fines in pool tailouts 1/ (% Fines)	Average Max Pool Depth 2/ (Meters)	Pool Frequency (Bankfull widths per pool) 3/		Pool Frequency (Pools per mile)		% Shade 4/
		Fines	Gravel	Cobble	Boulder	Bedrock			SCI	Primary	SCI	Primary	
Canyon	1292.4	12	33	36		0	12	1.19	14.3	16.7	8.6	7.8	85
Deep	431.22	0	30	13		30	19	0.5	2.9	NA	114.9	0	72
Kelsey 1	993	4	51	22	13	10	5	1.15	4.8	11.1	28.2	11.6	64
Kelsey 2	254	10	43	20	14	13	8	1.09	3.4	11.1	65	19.5	67
Middle 1	612.6	5	32	32	26	5	8	0.81	3.2	25	64.6	8.1	61
Middle 2	322.8	5	48	13	16	18	11	0.79	1.9	50	107.3	5.1	76
Mill 1	361.7	3	31	18	31	17	NA	NA	NA	NA	NA	NA	94
Mill 2	1035	7	25	38	21	10	6.	0.51	3.4	NA	103.7	0	92
Pat Ford	452	6	30	26	21	17	4.	0.5	4.3	NA	124.1	0	94
Tompkins	993	6	50	27	16	0	5	0.86	10	33.3	19.9	6.6	73
Wooliver 1	169.2	3	57	29	11	0	8	0.28	6.7	NA	97.5	0	NA
Wooliver 2	887.8	4	45	24	25	2	5	0.31	3.4	NA	187.9	0	93

1/ Substrate Composition: Percent of substrate size category and percent of fines in pool tailouts are standard metrics of substrate quality that were estimated

during stream surveys. Particle size breakdown: fines = <4mm; gravel =4-64 mm; cobble=64-256 mm; boulder=>256 mm. Overall, fines varied from 0 to 12% and fines in spawning gravels (pool tailouts) ranged from 5 to 19%.
2/ Maximum Pool Depth: Maximum pool depth is the deepest point measured in each pool. Average maximum pool depths varied from 0.28m to 1.19m.
3/ Average amount of bank channel widths between pools. SCI pools are of a depth of at least two times that of the pool tail crest. Primary pools are greater than three feet in depth.
4/ Average percent shade includes both canopy cover (stream shading provided by riparian vegetation), and topographic shade (stream shading provided by topographic features).

In-channel coarse woody material (CWM) data was gathered throughout the watershed, based on the Forest Service Region 5 SCI protocol. To be recorded, CWM had to be greater than 10 cm in diameter and longer than one-half of the bankfull width for the stream surveyed. The latter qualification indicates that minimum lengths recorded varied with stream size. "In-channel" CWM indicates that some portion of the wood recorded extended within the vertical boundaries of the bankfull margins of the stream surveyed. These data were combined, regardless of channel type, geology, and stream size. Table 3-4 summarizes wood frequencies for streams in the Lower Scott Analysis Area.

Table 3-4. Managed Stream Wood Frequency.

Stream	Average Pieces per Mile 1/	>30"X>50'/mile 2/	>12" X >26'/mile 3/
Canyon	167	0	110
Deep	212	0	37
Franklin's	530	0	129
Kelsey 1	417	0	221
Kelsey 2	102	0	72
Middle 1	184	0	87
Middle 2	158	5	81
Mill 1	171	0	68
Mill 2	382	5	150
Pat Ford	229	21	82
Tompkins	2705	1	1504
Wooliver 1	29	0	0
Wooliver 2	146	0	51
Avg over all reaches	418	2.5	199
Avg without Tompkins	227.3	2.6	90.7

1/ Includes all pieces longer than 6 feet.
2/ The LMP criteria for "key wood"
3/ Approximates the criteria for NMFS large woody material LWM on the "East-side."

Key Question #3a - What are the water quality, quantity, and beneficial use conditions of streams within the analysis area?

b - What are the water quality contributions of analysis area streams to the Scott River Basin?

c - What are the water quality contributions of the Scott River to the Klamath River Basin?

Analysis Area Water Quality

There are two areas that have different water quality conditions: the tributary streams (Canyon, Kelsey, Tompkins, Mill, etc.), and the main stem of the Scott River. Overall, water quality within the analysis area is good, especially in the tributary watersheds. However, increased runoff during intense storms in the winter can produce turbid water. To a large degree, this storm turbidity is a natural phenomenon due to erosion and landsliding, but to some degree, it can be increased by erosion from human activities, especially roads.

The main stem of the Scott River can have degraded water quality, especially during the low-flow season at the end of the summer/early fall. Stream flow in the main Scott diminishes to a very low level, and water temperatures increase to a level that may not be healthy for aquatic organisms. As the main Scott enters the canyon, the water is warm and has a strong diurnal variation after flowing 30 miles through the low-gradient reach in Scott Valley. In late July and early August of almost every year, daily maximum temperatures in the Scott River routinely reach the upper 70s and sometime the low 80s. Based on previous monitoring, summer water temperatures in the Scott are generally elevated at the tail end of the valley (in the vicinity of the USGS) gage), cool somewhat through canyon area of the Scott River, and again become elevated as the river nears its confluence with the Klamath River. The canyon appears to lower the daily maximums by a degree or two. However, by the time the Scott River reaches its mouth near Scott Bar, it has increased back to maximums in the upper 70s to low 80s.

By contrast, the tributary streams have much lower temperatures (in the 60s to low 70s) with a much lower diurnal fluctuation. Temperature monitoring in the tributary streams in 1998 and 1999 has shown that Tompkins Creek is warmer than Kelsey Creek, which is warmer than Canyon Creek. This appears to be an effect from the 1997 flood, due to the reduction of riparian canopy in Tompkins and Kelsey Creeks from debris torrents in January 1997.

The mainstem lower Scott River in the analysis area is a funnel for all anadromous fish activity (escapement, out-migration, rearing) in the Scott River system. As discussed, water quality and water flow issues are critical. Analysis area tributaries, such as Canyon, Kelsey, Middle, Tompkins, and Mill Creek, provide the only consistent perennial connection with the Scott River. Major upstream tributaries, such as Shackleford, Kidder, and, at times, even portions of the mainstem Scott River, go intermittent during summer months. Due to low flow conditions and elevated water temperatures, it is felt that many of the fish, resulting from spawning activity in the upper valley, flee to the canyon area to rear. Access into several analysis area tributaries is also possible for rearing purposes. As a result, the Lower Scott Analysis Area is viewed as vital to sustaining existing anadromous processes within the entire sub-basin.

There is currently no water quality monitoring being done in this area, other than temperature monitoring during the summer.

Klamath River Water Quality

In most rivers, water quality decreases steadily as it flows downstream. Many parameters of water quality in the Klamath River are maintained, or actually improved, as the river flows downstream of Seiad Valley and is diluted by cool, high quality water from numerous tributaries.

Water originating from the upper Klamath Basin and the Shasta and Scott Valleys is often of poor quality in summer because of agricultural water diversions, pollution from agricultural runoff (animal wastes, fertilizers, pesticides, herbicides), impoundment behind dams, and industrial discharge. This sometimes results in increased water temperature, depletion of dissolved oxygen, increases in toxic substances (such as ammonia and phosphorus), and other factors that can make the river environment intolerable for salmon, steelhead, and other species. Pure cool water from tributaries is important, and may be critical, in maintaining water quality in the Klamath River and providing thermal refugia for fish.

Water temperatures in the mid- and lower-Klamath River approach 80°F in some summers, and occasional fish kills are reported. For salmonids, temperatures above 72°F begin to cause stress, cessation of growth, and increased susceptibility to diseases. In the summer of 1997, the Klamath River was very warm. A maximum temperature of 81°F was recorded in the Klamath River, approximately five miles downriver of Happy Camp. Widespread fish kills occurred concurrently with high water temperatures from Seiad Valley to Weitchpec.

Key Question #4 - What is the extent of interim RRs, and how are they defined?

RRs are a land allocation, applicable to NFS lands and defined in the Forest Plan. As mapped in this stage of the analysis, RRs include the geomorphic types of active landslides, inner gorges, and toe zones of dormant slides. They also include the extent of water bodies and wetlands, 340-foot buffers (two site potential tree heights for this area) on each side of fish-bearing streams, and around lakes and natural ponds, 170-foot buffers (one site potential tree height) on each side of non fish-bearing perennial streams, around wetlands greater than one acre, and on each side of intermittent streams. The geomorphic types are as mapped on the geomorphic terranes coverage, update version November 1999. The lakes, ponds, and wetlands used for RR boundaries include those mapped on USGS 1:24,000 quadrangle maps. The streams include those on 1:24,000 maps, with additional streams added based on computer modeling, assuming a stream begins with twenty acres of accumulation.

The RR mapping used at this stage of the analysis depends on the interim RR guidelines in the Forest Plan and the unstable land and water feature mapping available when this analysis began. The geomorphic and stream mapping is not perfect; updates are required for project-level analysis. Step 5 of this analysis will discuss the probable extent of RRs, including more refined components, not yet mapped at this stage.

The extent of lands currently mapped as RRs, are displayed in **Figure 3-5** Riparian Reserve by Component, contained in the Map Packet located at the end of this document. In total, about 19,301 acres are mapped as RRs in the watershed. Of these, 9,550 acres of RRs are mapped within Matrix lands, which includes Retention, Partial Retention, Recreational River, and General Forest (excluding those riparian areas on private lands or within National Forest Wilderness, LSR, Special Habitat, or

Special Management land allocations). RR types are displayed in order of precedence, with active slides masking inner gorges, which mask toe zones. All unstable land types mask buffers on streams, lakes, or wetlands. Using this order of precedence, about 3% (612 acres) of the interim RR is active landslides, 43% (8,316 acres) is inner gorge, 5% (930 acres) is toe zone, and 49% (9,443 acres) is buffers on water bodies.

Aquatic-Dependent Species

Key Question #1 - What is the distribution, population size, and life history patterns of anadromous and resident salmonid species? What is the status and role of non-salmonid aquatic-dependent species?

Distribution:

The analysis area provides approximately 40.7 miles of anadromous habitat for fall run chinook salmon, winter run steelhead, winter coho salmon, and Pacific lamprey. Stable and significant populations of spring chinook and summer steelhead are largely extirpated from the analysis area and the Scott sub-basin. (Very small numbers of each species may be found occasionally during different water years in a few locations in the Scott River system). There are approximately 31.6 additional miles of habitat provided for other native fish species, including rainbow trout, Pacific brook lamprey, speckled dace, Klamath small-scale sucker, and marbled sculpin. The latter three species in the analysis area are located in the mainstem Scott River. Non-native species, including brown bullhead, green sunfish, and yellow perch, have been infrequently observed in the Scott River. The fish bearing streams of the analysis area are illustrated in **Table 3-5.** Other non-native fish, such as brook trout, brown trout, and rainbow trout, may be found in area streams, such as Canyon Creek and Kelsey Creek, that have headwater lakes in their drainages, containing the same species of fish. Information regarding the lakes of the analysis area is summarized in **Table 3-6. Figure 3-6** Anadromous and Resident Fish Range portrays the estimated extent of anadromous and resident fish in each stream. The upper extent of the anadromous reach is estimated, based on local knowledge of flows and physical barriers. The entire anadromous reach may not be accessible for spawning all years in all streams because of the complexity of flow/barrier interactions. The anadromous reach may be overestimated during most years for Kelsey and Middle Creeks. The length of the anadromous reach for Pat Ford and Franklin Creeks may also be overestimated for most flow years.

Table 3-5. Information Regarding Fish-Bearing Streams in the Lower Scott Analysis Area.

Stream	Watershed Acres	River Miles	Anadromous Miles 1/	Resident Miles 1/	Salmonid Species 2/
Scott River	97,680		21.6	(21.6)	Co, Ch, Sthd
Canyon	15,804	16	2.5	11.5 (14.0)	Co, Ch, Sthd
Kelsey	11,429	14.8	2.8 (0.6 mi)	9.0 (11.8)	Co, Ch, Sthd
Tompkins	9,321	11.8	5.1	(5.1)	Sthd
Mill	14,307	3.6	4.2	4.5 (8.7)	Co, Sthd

Middle	4,469	12.9	1.2 (0.12 mi)	2.2 (3.4)	Sthd
Pat Ford	1,873	5.0	1.3	(1.3)	Sthd
Wooliver	1,035	4.2	0.9	(0.9)	Co, Sthd
Big Ferry	2,022	6.3	--	0.5	Sthd
Franklin	2,158	2.3	1.1	(1.1)	Sthd
Boulder	2,771	16.3	--	3.9	Rainbow
Area Totals	97,680	-	40.7	(72.3)/31.6	-

1/ Miles given in parenthesis, such as (14.0) indicates the total length of the fish bearing reach, including both anadromous and resident stretches, for that stream. Stream mileage, such as 11.5, in the resident column without parenthesis, indicates the estimated length of the resident reach only for a given stream.
2/ Co = Coho Salmon; **Ch** = Chinook Salmon; and **Sthd** = Steelhead.

In Table 3-5, the watershed area is included to indicate relative stream size. This information, coupled with the miles of anadromous or resident stream present, indicates the relative quantity of habitat available in each stream. The river mile column indicates the location of the respective stream confluence with the Scott River, measured in river miles upstream from the confluence of the Scott and Klamath Rivers. Observations of anadromous salmonid species within the last 10 years are listed for each stream. (Boulder Creek is a perennial, fish-bearing stream, but due to its steep gradient which limits access and spawning habitat, it is not considered anadromous. It is assumed that it contains primarily rainbow trout due to the presence of the Wright Lakes in the upper part of the watershed). Franklin Gulch contains a very small population of salmonids, due primarily to limited access to habitat, created by the steep terrace at the stream mouth, as well as in-channel travertine deposits, which create many, small instream barriers. Adult fall chinook will spawn almost annually in Canyon Creek and very rarely in Kelsey Creek. Access by fall chinook to the latter stream is often restricted by low fall stream flows that make a steep (but short) bedrock descent into the Scott River.

Table 3-6. Information Regarding Lakes in the Lower Scott Analysis Area.

Lake	Watershed	Elevation	Acres	Max. Depth	Salmonid 1/
Upper Wright	Boulder	7,400	6.5	50	EB
Lower Wright	Boulder	6,900	26	90	RB, BR, EB
Deep	Canyon	6,350	16	68	RB, BR, EB
Aspen	Canyon	7,100	5.5	58	EB
Buckhorn	Canyon	7,100	2	25	RB, EB
Chinquapin	Canyon	7,150	3.5	25	RB, EB
Dogwood	Canyon	7,250	4	25	EB
Wolverine	Canyon	7,000	1.5	11	EB
Little Elk	Canyon	5,400	6	5	RB, BR
Shadow	Canyon	6,450	12.5	14	RB
Fryingpan	Canyon				NA
Upper Sky High	Canyon	6,000	4.0	38	RB, EB
Lower Sky High	Canyon	6,000	12.5	56	RB, BR, EB
Paradise	Kelsey	6,200	5	15	EB
Turk	Kelsey	NA	NA	NA	NA

1/ EB = Eastern Brook Trout; **RB** = Rainbow Trout; **BR** = Brown Trout.

Table 3-7. Redds by Reach by Year for Fall Chinook in the Lower Scott Watershed Area.

Year	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Reach 7
1992	*111	*See R1	17	25	8	44	32
1993	126	129	174	105	110	235	177
1994	182	164	96	70	15	35	**
1995	160	212	123	22	20	296	237

1996	88	130	122	51	76	274	129
1997	58	54	382	368	450	432	127
1998	73	37	63	104	57	101	102
Totals	**742**	**778**	**977**	**745**	**736**	**1,417**	**804**
Average No. of Redds	106	111	140	106	105	202	115
Estimated No. of Fish	212	222	280	212	210	404	230

Population Size:

General: A direct estimate of the number of spawning adult fall Chinook salmon is determined annually for the Scott River sub-basin. Population data for all other salmonid populations (juvenile steelhead, coho and chinook, and adult steelhead and coho) is much less precise, much more localized, less regular, and usually obtained by more indirect methods (redd counts, out-migrant trapping, etc.) than data obtained for adult chinook population. Specific population numbers and life history patterns for all other non-salmonid species within the analysis area is virtually non-existent.

Fall Spawn Survey: The annual cooperative fall chinook spawning surveys yields the best available information for an adult salmonid species within the analysis area. The survey estimates the entire Scott River fall chinook population (Peterson mark & recapture methodology). However, a redd survey by river reach is also conducted at the same time, and can also provide an estimate of population size. Redds by reach are indicated in the Table 3-7 for the years from 1992 to 1998.

Table 3-7 assumes that each redd accounts for two adult fish, one male and one female. Summing the average population by reach for the period from 1992 to 1998 yields an average yearly adult population of 1,770 fall chinook for the Lower Scott Subwatershed. There are approximately 21.6 river miles within the analysis area, and this equates to an average density of about 83 spawning adult chinook per mile in the analysis area per year.

Steelhead Redd Surveys: Steelhead redd surveys were undertaken with some consistency from 1980 through 1985, and in 1994 and 1995 in Canyon, Kelsey, and Tompkins Creeks. It should be noted that steelhead redd surveys are conducted during periods of elevated flow and often elevated turbidity. Successful observation of redds is dependent not only spawning adults being present, but also on the proper stream and weather conditions to view constructed redds. It is possible that redds could be constructed and be immediately obscured by the effects of elevated flows (tailings smoothed out, pots filled, etc.). Results are summarized in **Table 3-7**. In general, more redds were located in Tompkins or Kelsey Creeks than in Canyon Creek. Yearly averages by stream for the period from 1980 through 1985 were 12, 28 and 35 redds for Canyon, Kelsey, and Tompkins, respectively. Surveys in 1994 on the same three streams recorded only 3-5 redds each.

Steelhead redd construction can be more accurately defined and observed in the controlled space of the Kelsey spawning channel than in adjacent natural streams. As such, the Kelsey channel may provide a useful indicator of yearly steelhead run size (unverified). Redd construction in the channel was highly variable from year to year, ranging from as few as 0-1 redds per year (1985, 1986) to a high of 34 redds recorded (1988). The channel yearly average (1985-1991, 1994, and 1995) for the eight year period indicated was 16 redds.

Rearing assessments: The density of juvenile salmonids in several analysis area streams (Canyon, Kelsey, Tompkins, Middle, and Mill) was determined in 1997 and 1998 by snorkel diving. Again, results need to be considered primarily as indexes or trend indicators rather than absolute densities due to differences among individual divers in observations and, more importantly, not all fish in a given area will be observed due to their ability to hide or flee the area. Double counting of fish may also be a problem in some situations. Relative comparison of fish density from one stream to another may be useful, based on the assumption that hiding possibilities for fish from one stream to another are somewhat consistent. (This assumption imposes some limitations on data use). In general, fish populations were assessed in 1,000-meter reaches (some exceptions existed, e.g., Middle Creek was surveyed for 500 meters). In general, when the same stream was surveyed twice in one field season, densities were greater later in the summer (latter July - September) than in early summer (June). Reasons for such are unverified, but may include 1) higher flows encountered in early summer account for greater volume (but fish numbers remain the same), and 2) the fact that late emerging steelhead fry may not be yet present (or visible). All salmonids observed were steelhead/rainbows. Densities based on surface area were greatest in Kelsey Creek and least in Tompkins Creek, ranging from 5.82 fish/sq. meter to 0.08-fish/sq. meter, respectively. Densities based on volume were greatest in

Mill Creek and least in Tompkins Creek, ranging from 3.59 fish/cubic meter to 0.04-fish/cubic meter, respectively.

Juvenile salmonid fish densities for the mainstem Lower Scott River were estimated by habitat and species type during a 1988/1989 study (West et al, 1989). The five most common habitat types, in order of observed volume, on the lower Scott River were glides, runs, main channel pools, low gradient riffles, and step runs. Juvenile salmonid densities (coho, chinook, and steelhead) for all habitat types averaged 7.3 fish/cubic meter and 5.06 fish/ square meter. Approximately 90% of all salmonids observed were steelhead/rainbows. The habitat type illustrating the greatest salmonid density was a lateral scour pool that was wood-formed. However, only about 0.2% of all habitat in the lower Scott River was of this type. The next four habitat types illustrating the greatest salmonids densities were the high gradient riffle, secondary channel pool, step run, and pocket water. These four habitat types, plus the lateral scour pool (wood-formed); occupy approximately 15% of all observed habitat volume, but account for about 72% of all juvenile salmonids observed.

Life History Patterns:

The analysis area provides critical spawning, rearing and holding habitat for both adult and juvenile fish. The presence and timing of the anadromous fish species in the watershed are listed in Table 3-8, Adult Fish Species.

Table 3-8. Adult Fish Species.

Adult Species	Months Present
Spring chinook salmon	From July through October
Fall chinook salmon	From September through early December
Coho Salmon	From November through January
Summer steelhead	From July through May
Winter steelhead	From October through May
Pacific lamprey	From April through June

Anadromous young are found within the landscape year-round. Steelhead juveniles remain in the system up to three years and lamprey young (*ammocoetes*) remain up to seven years before out-migrating to the ocean. Most coho juveniles prefer to remain within freshwater for about one year before moving into the ocean; apparently, a very low percentage of chinook juveniles will do likewise (Olson, 1996). Most chinook juveniles appear to move out of Klamath River tributaries the first summer after emerging as fry from gravels.

Some additional studies have been done in the Lower Scott subwatershed that further illustrate life history patterns of salmonid and other aquatic species in the area and include: 1) chinook fry trapping in the Kelsey Channel, and 2) outmigrant fyke trapping of juvenile fish in 1994 and 1997 (District documents). Daily fyke trapping in the drought year of 1994 occurred at two sites (Jones Beach and Roxbury Bridge) on the Scott River and extended from latter May until early July. Results are summarized in an unpublished document at the District. Water temperatures during the low flows of 1994 approached diurnal peaks of about 80ºF by the end of June near the mouth of the Scott River (Roxbury Bridge). Capture rates for all three salmonid species (coho, chinook, and steelhead) had drastically declined by June 20 of that year at both sites. Capture of young lampreys (ammocoetes) significantly increased after mid-June of 1994.

Emergent fry trapping in the Kelsey Channel during the spring of 1994 indicated that emergence of chinook fry in coldwater tributaries, such as Kelsey Creek, initiated in mid-latter May, and extended into mid-June. The majority of fry emerged with a fork length of 35 to 37 mm. During the week of June 11-17, twenty emerging chinook fry from the Kelsey Channel had an average fork length of 35.6 mm. The main river chinook juvenile population sampled during the same week at the Roxbury Bridge, as described above, had an average fork length of 70.9 mm. The delayed emergence from coldwater tributaries increases the diversity in fork lengths among chinook juveniles for a given brood year in the Scott River system (and no doubt adds diversity to life history patterns as well). Results are summarized in an unpublished document at the District.

Fyke trapping in 1997 was initiated primarily to determine impacts of the January 1, 1997 flood on the fall chinook fry/juveniles from the 1996 fall spawning period. Trapping was again conducted at two sites, a mid-river site (Indian Scotty), and a lower river site (Franklin Gulch). Trapping occurred only one day per week at each site. It was initiated in mid-March and terminated in early July. Summary observations from this project include: 1) as expected, very few chinook juveniles were captured; 2) coho juvenile numbers were also low, but two primary peaks of capture occurred from latter March through mid-April and again in mid-June; 3) the capture of young of the year (YOY) Klamath small-scale suckers exploded in latter June and continued high for the remainder of the trapping period (early July); 4) significant numbers of sticklebacks were captured, especially before June; and 5) dace numbers were highest in April through mid-May. Results are summarized in an unpublished document at the District.

Local anglers report catching significant numbers of small steelhead/rainbows (steelhead halfpounders) during the fall chinook spawning period. Most of these fish are 12 to 18 inches in length, and seem to appear along with the spawning Chinook salmon and actively feed on roe as the chinook redds are constructed. Based on local input and observance of these fish during the annual fall spawn survey, it is felt that this population has increased significantly the 1998 and 1999 seasons.

Presence/Status of non-salmonid aquatic-dependent species in the analysis area:

As discussed in Step One, freshwater mussels, limpets, and other mollusk species, are present in the Lower Scott Analysis Area. A small amount of indirect information is available on the District regarding some of these species, primarily as a result of notes made during other activities (e.g., summer steelhead dives). Some of the larger mussel beds in the Scott River system are observed in the analysis area.

Aquatic insect collections were made in Tompkins and Canyon Creeks in the fall of 1997. These collections were oriented at describing the species present. They were sent to the BLM BUGLAB at Utah State for identification. These summary reports are on file at the District.

Key Question #2 - What aquatic-dependent species are threatened, Endangered, Proposed, Petitioned, or Sensitive?

The Klamath Mountain Province Evolutionarily Significant Unit (ESU) of Steelhead, including both the summer and winter run, has been given candidate status under the *Endangered Species Act* (ESA). Summer steelhead are Regional Forester-designated Sensitive species. The Southern Oregon/Northern California Province ESU of coho salmon has been designated threatened under the ESA. Spring chinook are Regional Forester-designated sensitive species. Pacific lamprey and western pond turtles are both State of California species of special concern. Western pond turtles are also Regional Forester-designated Sensitive species.

Aquatic Survey and Manage (SM) mollusks are not known to occur in the Lower Scott Analysis Area; however, no formal surveys have been conducted to date (11/10/99). *Fluminicola n. sp. 1*, the nearest known SM aquatic mollusk species, occurs above the confluence of the Shasta and the Klamath River.

Key Question #3 - What areas are critical for maintenance, protection, and recovery for at-risk species?

Key spots for fall chinook spawning (several years of record) are illustrated on maps at the District. It is probable that coho, spring chinook, and steelhead would also utilize some of these same areas. Steelhead, which spawn during the higher flows of spring, also often use spawning gravels associated with channel margins in the main river and tributaries. These areas may actually be dry or near dry during the time of fall chinook spawning. Areas of steelhead spawning are not identified in the main river, but some information for steelhead spawning by reach in the tributaries is available on the District. Little is known about location and timing of coho spawning. Information from snorkel dives discussed earlier indicate coho rearing streams (and probably also coho spawning streams.) Large, deep holding pools are available for early run fish (summer steelhead and spring chinook) in the Lower Scott subwatershed, but water quality factors, especially water temperature, is often unfavorable for these fish.

The mainstem lower Scott River in the analysis area is a funnel for all anadromous activity (escapement, out migration, rearing) in the Scott River system. Analysis area tributaries, such as Canyon, Kelsey, Middle, Tompkins, and Mill Creeks, provide the only consistent perennial connection with the Scott River. Major upstream tributaries, such as Shackleford, Kidder, and, at times, even portions of the mainstem Scott River, go intermittent during summer months. Due to low flow conditions and elevated water temperatures, it is felt that many of the fish, resulting from spawning activity in the upper valley, flee to the canyon area to rear. Access into several analysis area tributaries, is also possible for rearing purposes. As a result, the Lower Scott Analysis Area is viewed as vital to sustaining existing anadromous processes within the entire sub-basin.

Key Question # 4 - To what extent does the Lower Scott Watershed contribute to Scott River Basin fisheries? To what extent does the Scott River anadromous fish populations contribute to Klamath River basin fisheries?

Again, fall chinook populations are the most accurately (easily) tracked salmonid population in the Scott sub-basin. Fall chinook redd counts by reach are portrayed in Table 3-7. Chinook redds constructed in the Lower Scott Analysis Area vary from 29 to 100% of all redds constructed in the Scott River system from 1992 through 1998. On the average, for the 1992 to 1998 period, 52%

of all chinook redds were constructed in the analysis area. (The Lower Scott Analysis Area is increasingly important for chinook spawning in those years of low river flow and when fall rains are delayed past the time of normal chinook spawning). Recognizing the fact that the Scott River is a major contributor of wild stock production for the entire Klamath system (the Scott has been the number one tributary half of the time since 1992, excluding the Trinity River system), and that half of the production comes from the analysis area, the Lower Scott is vitally important for sustaining wild chinook populations in the mid-Klamath River area.

Prime coho salmon production areas were probably historically located in the valley portion of the Scott River system, while prime steelhead production probably occurred in the valley area, as well as in the analysis area. (The valley portion of the Scott River may have been the most productive coho system in the entire Klamath River system). However, as discussed, water flows and water quality issues are felt to have contributed to significant declines in the populations of these two species. Similar conditions exist in the mainstem Klamath flowing out of Irongate Reservoir and the Shasta River. As a result, the entire Scott River system, including the analysis area (and the upper Klamath and Shasta Rivers), does not contribute to the larger mid-Klamath meta-population for coho salmon and steelhead, as it did historically.

Terrestrial

Forest Health

Introduction- For this analysis, healthy forest conditions are defined as a forest containing a variety of plant and animal species with genetic diversity, a forest that is resilient to large-scale disturbance, and where these conditions are sustainable over time. EUI data is available for lands within the Forest boundary and will be utilized along with mortality flight data to determine forest health.

Factors affecting forest health are interrelated, and often work in combination with one another. Some of these factors are tree species, seral stage, stocking density, insects and disease, and fire behavior potential.

A variety of insects and diseases are found in the watershed. The most prevalent include: white pine blister rust, dwarf mistletoe, western pine beetle, pine engraver beetle, and fir engraver beetle. These pathogens are found throughout the watershed and are part of the natural processes of healthy forest stands. They become a problem when a combination of factors (e.g. drought, fire exclusion) provide a catalyst for epidemic out-breaks, resulting in high levels of tree mortality.

Overstocking can be defined as a condition of the vegetation that is or will exceed the site capabilities over time, leading to stagnation, reduced growth and vigor, and eventually mortality. Stands of varying densities occur throughout the watershed. Stands considered over-dense (over-stocked stands) are those stands in which the vegetative biomass is greater than that which can be sustained over time. Without the natural disturbance regime (primarily fire, but also insects and diseases) or management, almost all stands will achieve this state. White fir encroachment in the understory in many of the mixed conifer stands is a major factor contributing to development of stand densities beyond site capacity. Within the area covered by the EUI, there are approximately 12,150 acres with a white fir understory. The dense white fir understory is probably the major contributor to over-stocking problems in the analysis area.

Key Question #1 - Where does mortality exist within the watershed and what are the current levels?

Summary Response- Mortality has been found scattered throughout the analysis area; 19,900 acres have been identified as having low to high mortality. Most of the conifer mortality is within wilderness or LSRs.

Background Information- Using Region 5 tree mortality flight survey protocol, flights completed in 1993 to 1999 have identified 2,580 acres of high conifer mortality in the analysis area, 10,345 acres of moderate conifer mortality, and 6,975 acres of low conifer mortality on public lands in the analysis area. See Figure 3-7 Conifer Mortality, contained in the Map Packet located at the end of this document, for the 1993 through 1999 survey results. Mortality areas identified vary in size, with the smallest being pockets of approximately 20 acres. Table 3-9 Acreage of Mortality by Existing Vegetation Type, identifies the acres of mortality by vegetation type. These areas need further site investigation to field-verify actual mortality and conditions on the ground.

Table 3-10 Acreage of Mortality by Management Area, identifies the acres of mortality by management area. Levels of mortality are identified by examining conifer stands with similar size and density characteristics and determining the percent of mortality within each stand. The percent of recent mortality in conifers determines the rating of high, moderate, or low.

Table 3-9 indicates that areas experiencing higher than normal levels of mortality may be found in the Douglas fir mixed conifer, ponderosa pine mixed conifer, white fir mixed conifer, hardwood mixed conifer, and true fir vegetation types. Causes for increased mortality in these areas include overstocking (which weakens trees), weak root systems (which allows for increases in blow down during wind events), openings in stands caused by blowdown (which allows for more wind), and diseases, including dwarf mistletoe and *Cytospora abietta*. **NOTE:** High mortality areas are defined as greater than 10% of tree stems recently dead; moderate mortality with 5 to 9% stems recently dead, and low at 1 to 4% recently dead.

Table 3-9. Acreage of Mortality by Vegetation Type.

Vegetation Type	Total Acres	Low	Mod-erate	High
Douglas-fir/Mixed Conifer	6575	2,850	3,328	397
Ponderosa/Pine Mixed Conifer	2527	1,223	1,109	195
Ultramafic/Mixed Conifer	150	121	11	18
White Fir/Mixed Conifer	2006	853	850	303
True Fir	894	403	71	420
Subalpine Mixed Conifer	623	64	104	455
Hardwood Mixed Conifer	3453	703	2,750	133
Hardwood	543	166	371	6
Riparian	166	49	117	0
Aspen	10	0	0	10
Shrub, Natural	918	283	189	446
Shrub, Harvested	909	260	451	198

Table 3-10 indicates that management areas with significant amounts of mortality include LSR and Partial Retention. The latest Mortality Survey Flight was done in the spring of 1999, immediately following spring underburning through Partial Retention and General Forest management areas. Much of the mortality identified within Partial Retention was caused by this underburning, an intended objective of the burn. The recent mortality found within LSR, Wilderness, RR, and other management areas than Partial Retention and General Forest, is a result from insect, disease, and disturbances other than fire.

Table 3-10. Acreage of Mortality by Management Area.

Management Area	Total Ac.	Low	Moderate	High
Wilderness	1,855	424	274	1,157
LSR	7,700	1,832	5,036	832
Sensitive Species	308	308	0	0
RR	1,888	859	886	143
Scenic River	117	36	81	0
Retention	224	216	108	0
Recreational River	317	155	128	34
Partial Retention	4,012	2,074	1,851	87
General Forest	994	678	194	122
TOTAL	**17,415**	**6,582**	**8,558**	**2,375**

Key Question #2 - What are the current vegetation communities in the watershed?

Summary Response- An EUI was used to develop 12 distinct vegetation communities. The mixed conifer and true fir communities together make up 61% of the area within the Forest boundary. Plantations cover 7% within the Forest boundary. Hardwood dominated stands cover 21%. Riparian, natural shrub, sub-alpine conifer, and meadows comprise 11% of the area within the Forest boundary. Areas outside of the Forest boundary were not included in the EUI; for the analysis area, this represents approximately 7,300 acres.

Background Information- An EUI was completed for the area within the Forest boundary. For this analysis, the EUI information was combined into twelve plant communities. Table 3-11, Vegetation Community Acreage, identifies these communities, their acreage, and percent of the mapped area. In this analysis area, the plant communities are dependant on elevation, precipitation, soils, and exposure. The analysis area ranges in elevation from 2,000 to 8,000 feet, and average annual precipitation varies from 20 inches per year in the lowest elevations to greater than 60 inches annually at the highest elevations. For the spatial distribution of the plant communities, see Figure 3-8 Existing Vegetation.

Table 3-11. Vegetation Community Acreage.

Vegetation Type	Acreage	% Mapped EUI Area
Douglas-fir/Mixed Conifer	25,585	28
Ponderosa Pine/Mixed Conifer	10,730	12
Ultramafic/Mixed Conifer	635	<1
White Fir/Mixed Conifer	10,650	12
True Fir	7,055	8
Subalpine Mixed Conifer	4,495	5
Hardwood Mixed Conifer	16,675	18
Hardwood	2,525	3
Riparian	430	<1
Aspen	150	<1
Shrub, Natural	7,080	8
Shrub, Harvested	4,260	5
Lakes	120	<1
No Data	7,295	
TOTAL	**97,685**	

The **Douglas-fir/Mixed Conifer Community** is one of the most varied communities. In some places, it is a transition from the true fir to the oak woodlands; in other places, it is primarily Douglas fir and deciduous hardwoods (black oak and Oregon white oak). The one constant is that Douglas-fir is the dominant tree species. The community consists of 57% mid-mature and late-mature/old-growth seral stages, and 50% of this is at 80-100% crown closure. Table 3-12, Douglas-fir/Mixed Conifer Seral Stages, displays acres and percent of community for each seral stage. Seral Stages were determined during the EUI, and tend to correlate with size class. Diameter breast height (DBH) sizes for each seral stage translates to: Pole, 6-11 inches; Early Mature, 11-21 inches; Mid-Mature, 21-36 inches; and Late-Mature/Old Growth, greater than 36 inches.

Table 3-12. Douglas-fir/Mixed Conifer Seral Stages.

Seral Stage	Acres	% of Community
Pole	659	3
Early Mature	10,445	41
Mid-Mature	9,540	37
Late-Mature/Old-Growth	4,940	19

The **Ponderosa Pine/Mixed Conifer Community** is found scattered throughout the analysis area. Ponderosa pine is, of course, the dominant overstory species. Douglas-fir, white fir, sugar pine, and incense cedar can all be found in the overstory. Understories tend to be dominated by white fir, Douglas-fir, and incense cedar. Overstory trees tend to be widely spaced greater than 20 feet. Table 3-13, Ponderosa Pine/Mixed Conifer Seral Stages, displays acres and percentage of community for each seral stage.

Table 3-13. Ponderosa Pine/Mixed Conifer Seral Stages.

Seral Stage	Acres	% of Community
Pole	1,469	14
Early Mature	5,523	51
Mid-Mature	2,228	21
Late-Mature/Old-Growth	1,507	14

The **Ultramafic/Mixed Conifer Community** consists of vegetation adapted to ultramafic soils. In the analysis area, much of this community is found in the Tom Martin Creek drainage. This is a mid-elevation community, found on warm open sites on serpentine soils. These soil conditions limit growth density and plant species. Among the conifers, Jeffrey pine is the most adaptable, with Douglas-fir and incense cedar also found here. The understory is often dominated by grass, primarily California fescue. Ceanothus species are the most common shrubs. Many rare plants are endemic to these ultramafic soil types. Table 3-14, Ultramafic/Mixed Conifer Seral Stages, displays acres and percentage of community for each seral stage.

Table 3-14. Ultramafic/Mixed Conifer Seral Stages.

Seral Stage	Acres	% of Community
Pole	0	0
Early Mature	13	2
Mid-Mature	344	54
Late-Mature/Old-Growth	279	44

The **White Fir/Mixed Conifer Community** tends to be a transition zone between the true fir and the Douglas-fir/Mixed Conifer communities. This community is typically found between the elevations of 4,000 and 5,000 feet. It is found both in the north and south ends of the analysis area. White fir and Douglas-fir are the most common conifer species, with ponderosa pine, incense cedar, and sugar pine present. Some hardwoods, including black oak, Pacific madrone, and giant chinquapin are also found. Stands in the mid-mature and late-mature/old-growth seral stages are moderately dense with 89% (greater than 40% canopy closure). Table 3-15, White Fir/Mixed Conifer Seral Stages, displays acres and percent of community for each seral stage.

Table 3-15. White Fir/Mixed Conifer Seral Stages.

Seral Stage	Acres	% of Community
Pole	146	1
Early Mature	2,225	21
Mid-Mature	3,688	35
Late-Mature/Old-Growth	4,587	43

The **True Fir Community** is found on good sites at high elevations (typically above 5,500 feet) in the analysis area. The largest band of true fir is found from Tom Martin Peak in the north, to the west and south into the Seiad LSR and Marble Mountain Wilderness. White and red firs dominate and are maintained with high densities. Small amounts of Brewer spruce, mountain hemlock, Douglas fir, western white pine, and incense cedar are also found in this type. Table 3-16, True Fir Seral Stages, displays acres and percentage of community for each seral stage.

Table 3-16. True Fir Seral Stages.

Seral Stage	Acres	% of Community
Pole	66	1
Early Mature	713	10
Mid-Mature	3,235	46
Late-Mature/Old-Growth	3,041	43

The **Subalpine Mixed Conifer Community** is found at the highest elevations of the analysis area, with most found at the headwaters of Grider Creek. The largest blocks are found within the Marble Mountain Wilderness Area. Glaciated slopes with thin soils and abundant moisture characterize the subalpine forest. Nearly barren slopes are common, although a variety of high elevation species are found scattered in the community. The harsh sites and short growing season often limit conifer size and density. The principal overstory species are red fir, mountain hemlock, western white pine, foxtail pine, and white fir. The understory can consist of ocean spray, Drummond pasque flower, pinemat manzanita, and quill-leaved *lewisia*. Table 3-17, Subalpine Mixed Conifer Seral Stages, displays acres and percentage of community for each seral stage.

Table 3-17. Subalpine Mixed Conifer Seral Stages.

Seral Stage	Acres	% of Community
Pole	44	1
Early Mature	414	9

Mid-Mature	1,806	40
Late-Mature/Old-Growth	2,232	50

The **Hardwood/Mixed Conifer and Hardwood Communities** are generally found at lower elevations and drier sites within this watershed. It often occurs in a mosaic-like pattern, with small stands of conifers interspersed among the stands of hardwoods. Conifers are most often found on moister sites with deeper soils. Table 3-18, Hardwood Mixed Conifer Seral Stages, displays acres and percentage of community for each seral stage.

Table 3-18. Hardwood Mixed Conifer Seral Stages.

Seral Stage	Acres	% of Community
Pole	67	<1
Early Mature	7,607	40
Mid-Mature	9,621	50
Late-Mature/Old-Growth	1,907	10

The **Riparian Community** is found along the Scott River, major tributaries, including Canyon, Kelsey, Mill, and Tompkins Creek drainages, and wet seeps and slumps. This community is a remnant of the once common deciduous tree community that was found all along the Scott River and the lower reaches of its major tributaries. Along the Scott River, the primary plant species is willow, while in other areas alder, cottonwood, and big leaf maple dominate. Conifers are not common, with Douglas-fir the most prevalent of those present. Most of this community is in younger seral stages, which is mostly due to past floods and landslides. Table 3-19, Riparian Seral Stages, displays acres and percentage of community for each seral stage.

Table 3-19. Riparian Seral Stages.

Seral Stage	Acres	% of Community
Pole	19	4
Early Mature	362	84
Mid-Mature	42	10
Late-Mature/Old-Growth	7	2

The **Aspen Community** is a component of the riparian community. Aspen is a riparian species that occurs in and around wet meadow areas in higher elevations. Aspen is a relic of the ice age that was once more widespread, but is now found in isolated high elevation pockets. Aspen communities contain a wide variety of forbs, grasses, and shrubs, some of which occur nowhere else. The aspen component of the riparian community has been separated out for this analysis since currently, most of the aspen exists in a mature or decadent age class with little or no reproduction. The early-mature seral stage has a size of 11-21 inch DBH. At full maturity (80-100 years), aspen has a DBH of between 11-21 inches.

The **Shrub, Natural Community** is composed of shrub fields and sparsely vegetated areas that are found on harsher sites throughout the analysis area. This community is also found in areas following disturbance, such as stand-replacing fire.

The **Shrub, Harvested Community** is composed of areas that were clear cut harvested from the 1960s through the 1980s. Most of these areas are now established plantations, although some areas are shrub-dominated.

Key Question #3 - Are there conifer stands at risk of catastrophic loss and, if so, where are they located?

Summary Response - Conditions in conifer stands that can be identified as not sustainable over time are those where stand density exceeds the long-term capacity of the site. There are approximately 12,000 acres with white fir encroachment in the understory, and 19,720 acres where overstory densities are in a condition where the stands may be considered at risk to large-scale disturbance. These developing conditions are not sustainable and will likely create conditions that lead to stand-replacing events. See Figure 3-9, Stands at Risk.

Background Information - For this analysis, stands at risk are conifer stands where the long-term sustainability is in doubt. Where the stand density exceeds the carrying capacity of the site, the trees become susceptible to Forest pathogen epidemics, and the stand becomes susceptible to stand-replacement fire. Using EUI soil site class, stand density, and seral stage; the following parameters were used to determine stands at risk. Seral stages from pole to mid-mature (from 6-30 inches DBH) were focused on, and soil sites classes were divided into two groups (site classes 2-4 and 5-7). On site classes 2-4, stands with greater than 80% canopy closure were identified as at-risk, and on site classes 5-7, stands with greater than 60% canopy closure were identified as at risk. Mixed conifer stands with a white fir understory were also identified as potential stands at risk. Using these parameters, 19,207 acres with high overstory canopy closure and 5,394 acres of mixed conifer with a white fir understory have been identified in the analysis area. Some of these areas have both high stand density and white fir encroachment. The total area is approximately 22,000 acres of stands at risk (see Figure 3-9 Stands At-Risk, contained in the Map Packet located at the end of this document).

Fire Management

Key Question #1 - How does the current fire regime impact vegetation within the analysis area?

The fire regime is the most widespread and dynamic disturbance regime affecting the analysis area. Lightning fires are ignited in the watershed nearly every fire season. Fires occurring in the area affect the vegetation communities with a variety of severities. The more infrequent fire returns to the landscape, the greater the potential severity of the resulting fire effects. Effects found within large fires include areas of high, moderate, and low severity. The amounts of each depend on conditions existing at the time of the fire occurrence. Weather conditions, available fuels, and topography are the deciding conditions for the severity of fire.

An aggressive fire suppression response has been effective since approximately 1920. Most fires have been contained within small areas (less than one acre), but on occasion, the number of starts overwhelms the suppression forces and large fires are the result. The most recent example for the analysis area occurred in 1987, when 8,790 acres (within Kelsey, Deep, and Tompkins Creek drainages) were burned by lightning ignited fires.

With a successful fire suppression record, a lack of fire has allowed the development of overly dense vegetation communities with high fuel loadings. Under the current fire regime (suppression), the influence of fire as a process has been dramatically reduced. As the time since the last fire lengthens in these fire-prone forests, surface fuels and live ladder fuels **will** accumulate. Accordingly, the probability of large, severe fires **will** likely increase (Taylor and Skinner, 1998). In general, these conditions will increase fire severity throughout the analysis area. This will be discussed more in Step 5.

Key Question #2 - What are the current fuels and fire behavior potential in the analysis area?

Fire behavior potential modeling is done in order to estimate the severity and resistance to control that can be expected when a fire occurs during what is considered the worse case weather conditions. Late summer weather conditions are referred to as the 90th percentile weather data, which is a standard used when calculating fire behavior (90th percentile weather is defined as the severest 10% of the historical fire weather; i.e., hot, dry, windy conditions occurring on mid-afternoons during the fire season).

This modeling incorporates fuel condition, slope class, and 90th percentile weather conditions in calculating projections on flame lengths and rates of spread. To identify fuel conditions, a crosswalk is developed from the existing vegetation layer to fuel models (see Figure 3-10 Fuel Models, contained in the Map Packet located at the end of this document).

Three slope classes are utilized in the fire behavior potential modeling: less than 35%, 35-65%, and greater than 65% slope. The 90th percentile weather data is based on 20 years of data collected at Oak Knoll Ranger Station and Collins Baldy Lookout, which are the representative weather stations for the analysis area.

Fire behavior potential ratings of low, moderate, and high are identified from the fire behavior modeling (see Figure

3-11 Fire Behavior Potential, contained in the Map Packet located at the end of this document). A **low** rating indicates that fires can be attacked and controlled directly by ground crews building firelines and will be limited to burning in understory vegetation. A **moderate** rating indicates that hand-built firelines alone will not be sufficient in controlling fires, and that heavy equipment and retardant drops would be more effective. Areas rated as **high** represent the most hazardous conditions in which serious control problems would occur. Control lines would be established well in advance of flaming fronts, and heavy equipment and backfiring might be necessary to widen control lines.

For more information on fuel modeling and the development of fire behavior potential for this analysis, refer to Appendix-D, Fire and Fuels. For the portion of the watershed covered by EUI data (within the Forest boundary), 50% is considered to have low fire behavior potential, 36% moderate, and 14% high. See Figure 3-11, Fire Behavior Potential, for mapped fire behavior potential ratings. Table 3-20, Acreage by Fire Behavior Potential, identifies the acres of high, moderate, and low fire behavior potential and the percent of each found within the area of the watershed covered by the EUI.

Table 3-20. Acreage by Fire Behavior Potential (for the area covered by the EUI).

Fire Behavior Potential	Acreage	% of Watershed
High	12,411	14
Moderate	30,986	36
Low	41,204	48
Non-Flammable	1,781	2
TOTAL	**86,382**	**100**

Table 3-21, Fire Behavior Potential Acreage by Vegetation Community, identifies the acreage of high, moderate, and low fire behavior potential within each vegetation community.

Table 3-21. Fire Behavior Potential Acreage by Vegetation Community (for the area covered by the EUI).

Vegetation Type	Non-flammable	Low	Mod-erate	High
Douglas-fir/Mixed Conifer	263	7,399	13,698	4,225
Ponderosa Pine/Mixed Conifer	174	6,098	2,928	1,528
Ultramafic/Mixed Conifer	0	77	120	103
White Fir/Mixed Conifer	0	3,138	5,796	1,633
True Fir	0	2,556	3,603	726
Subalpine Mixed Conifer	0	2,445	498	530
Hardwood Mixed Conifer	1,075	15,453	21	125
Hardwood	139	1,893	305	190
Riparian	9	417	0	3
Aspen	0	148	0	0
Shrub, Natural	0	1,168	2,072	1,698
Shrub, Harvested	0	413	1,944	1,650

Key Question #2a - What are current fuels conditions in and around the urban interface?

The urban interface is found mostly in the lower elevations of the analysis area, and usually in areas with naturally occurring flashy fuels. Fires occurring during 90th percentile weather will be fast moving, mostly low to moderate intensity, with areas high intensity, which will vary depending on fuel accumulations. Fires are ignited by lightning each summer and occasionally by humans. Residences, power lines, industrial equipment, recreationalists, and travel routes are all possible human ignition sources.

Fire behavior potential (hazard) identifies the availability of fuels to sustain a fire. A complete description of the development of fire behavior potential ratings and their meaning can be found in Appendix-D - Fire and Fuels. Figure 3-11 identifies areas of high, moderate, and low fire behavior potential throughout the analysis area. Also identified are the boundaries of interface zones: the Scott Bar and Mill Creek zone, the River Corridor zone, and the Scott Bar Mountain zone. Tables 3-22, 3-23, and 3-24 identifies the acres and percent of high, moderate, and low fire behavior potential within these interface zones, respectively.

Table 3-22. Scott Bar and Mill Creek Zone Fire Behavior Potential Acreage.

Fire Behavior Potential	Acreage	% of Interface Area
High	901	10
Moderate	2,904	33
Low	4,552	52
Non-flammable	456	5
Total	**8,813**	

Table 3-23. River Corridor Zone Fire Behavior Potential Acreage.

Fire Behavior Potential	Acreage	% Of Interface Area
High	444	9
Moderate	1,365	27
Low	2,855	58
Non-flammable	286	6
Total	**4,950**	

Table 3-24 Scott Bar Mountain Zone Fire Behavior Potential Acreage.

Fire Behavior Potential	Acreage	% Of Interface Area
High	53	2
Moderate	499	21
Low	1,787	76
Non-flammable	15	1

Total	2,353	

Key Question #2b - What and where are threats to urban interface?

Wildfires occur when environmental conditions are favorable for the spread of fire, given an ignition. These environmental conditions are referred to as the fire environment. The fire environment is composed of fuels, topography, and weather. The intensity, resistance to control, and the ecological and social effects of any wildfire are ultimately the sum of the three components. Of these, only the fuel component can be altered.

Typically, interface zones are found within areas of naturally occurring highly volatile fuels. Interface zones within this analysis area are no exception. They are found mostly at lower elevations and foothill areas where flashy fuels, such as grass, forbs, and chaparral, occur.

Wildfires threaten interface zones from both inside and outside the interface zone. Within the interface, fires can spread through continuous fuels from one residence to another residence, to other private property, or to State and Federal lands. Fires can also spread through continuous fuels on State and Federal lands to the interface zones to threaten life and property.

Fire prevention programs are conducted by both Forest and the California Department of Forestry and Fire Protection to help reduce the occurrence of human-caused fires. Lightning fires are an annual occurrence that should be expected and planned for.

Key Question #3 - What are public concerns related to fuels and fuels treatment activities?

The local public's concerns regarding fuels and fuels treatment activities are focused on fuels that are on, or adjacent to, their properties. Underburn projects being planned near the Scott Bar domestic water source are also a concern. The public is aware that high fuel accumulations are a threat to their property and residences. They are not sure how best to reduce these fuels accumulations. Smoke volume also appears to be of primary concern to the local public. Smoke produced from underburning is sometimes at levels higher than the local public is willing to tolerate, raising concern for health issues. The appearance of high burn intensities is also a concern with local residents and the Scott Bar community. This concern could probably be mitigated through time and communication, as was evidenced with the Scott Bar Mountain underburn project.

Key Question #4 - Are there any agreements already in place to allow joint ventures with private landowners to reduce fuels adjacent to and possibly within their properties (in the best interest of both parties)?

A Memorandum of Understanding (MOU) for burning between Federal, State, and Local Governments was updated and signed this year.

Key Question #5 - How does the current road system contribute to fire suppression and fuels treatment activities?

See Figure 6-2, for a display of Important Roads for Fire Suppression and Fuels Treatment, located in the map packet in the rear of this document.

Late-Successional Habitat

Key Question #1 - What is the current distribution and condition of late-successional habitat within LSRs and within the analysis area?

At the watershed scale, the Lower Scott landscape is heterogeneous; there are a variety of different vegetation types and stages of development (successional stages). The amount and distribution of late-successional forest in the landscape has been identified as an issue, due to loss of older forest through timber harvest, road building, and wildfire. Loss of late-successional forest habitat, and the less obvious isolation of existing habitat patches, are aspects of late-successional forest fragmentation that may threaten the viability of wildlife species dependent on older forests.

Within the Lower Scott Analysis Area, the structure and composition of late-successional coniferous forest is naturally variable due to diverse biological and physical conditions and natural disturbance events (fire, floods, wind, and insects). Climate and topography have strong influences, spatially and temporally, on vegetative characteristics within the area. The influences of topography, aspect, and natural disturbance events result in diverse, fragmented vegetative patterns on the landscape.

The watershed contains approximately 76,000 acres of forested habitat, with a wide variety of crown closures and diameter classes, within the Forest boundary. Of that, approximately 43% (32,930 acres) is currently in a dense, late-successional forest condition (defined as mid-mature, late-mature, and old-growth in the Forest geographic information system (GIS) database). Stands range from true fir at higher elevations to mixed conifer stands dominated by Douglas-fir/white fir from 4,800 to 5,500 feet, and Douglas-fir/ponderosa pine associations at lower elevations. Dominant hardwood associates tend to be canyon live oak (*Quercus chrysolepis*) on poor sites and at higher elevations, and black oak (*Quercus kelloggii*) and Pacific madrone (*Arbutus menziesii*) on productive sites at lower elevations.

Within the analysis area, a general pattern of decreasing mean annual precipitation occurs as one moves from the southwest to the northeast portions of the landscape. Mean annual rainfall ranges from 85 inches in the Little Marble Valley area to 25 inches along the Scott River and 35 inches in the eastern portion of Mill Creek. This wide variation in precipitation is reflected in the change in forest structure as one moves east through the landscape. Densely forested habitats in the western portion are dominated by true fir and Douglas-fir mixed conifer, while more open forested habitats in the eastern portion are dominated by pine mixed with hardwoods or brush.

Forest management activities have influenced late-successional forest habitats in the analysis area. Timber harvest and road building have accounted for most of the management that has impacted vegetation and influenced the amount of late-successional habitat currently found today. Most timber harvest focused on late-successional stands that were thought decadent and in need of treatment, or focused on burned areas as part of a fire salvage program. Roughly 8,000 acres (9% of the analysis area within the Forest boundary) of forested land (Forest Service only) have been clear-cut or partial cut through timber harvest and fire salvage since the 1930s. In addition, there are approximately 312 miles of roads (Forest Service, private, State, County, and non-system) within the Forest boundary in this analysis area. Clearing through timber harvest and road building has reduced the amount of late-successional habitat and fragmented larger blocks of habitat.

Timber harvest on private land has also reduced the amount of late-successional forest. Private commercial timberlands occupy 23% of the entire watershed (22,980 acres); of that amount, approximately 9,000 acres are outside of the Forest boundary. The majority of the private land base (83%) is commercial timberland; management of these lands focuses on maximum production of forest products. It can be expected that the majority of private commercial timber ground will be in an early to mid-successional stage of development, with pockets of older forest throughout.

Large wildfires, burning with varying degrees of intensity, have also reduced and fragmented late-successional habitat. Conversely, the successful exclusion of fire in portions of the analysis area has resulted in changes to forest structure and species composition. Fire suppression has changed the fire regime from frequent low intensity surface fires, to infrequent, but devastating, stand-replacing fires (refer to Fire Management discussion earlier in this document). The results of these changed conditions include increases in dead and live fuel, development of ladder fuels, and a closed canopy that can sustain a crown fire.

Currently within the analysis area, there are 32,930 acres of late-successional habitat within the Forest boundary (this figure excludes acres of private land within the watershed that are located outside of the Forest boundary). Distribution of late-successional habitat by Management Area is displayed below in Table 3-25 (refer to Figure 1-2 for Forest Plan Management Areas and Figure 3-13 for Seral Stages).

Table 3-25. Late-Successional Habitat by Management Area.

Management Area	Acres of Late-Successional Habitat
Late-Successional Reserve: Seiad	5,245
Late-Successional Reserve: Collins-Baldy	1,772
100-acre LSRs	890
Sensitive species	203
Wilderness	8,874
RR	4,069
Recreational River	537
Scenic River	364
Retention	335
Partial Retention	6,092
General Forest	2,273
Private land within Forest boundary	2,275
Total	**32,930**

Table 3-25. Late-Successional Habitat by Management Area.	
Management Area	**Acres of Late-Successional Habitat**
Private land outside of Forest boundary	No data on forest structure

Large LSRs cover approximately 22% of the analysis area (19,550 acres); two LSRs overlap the analysis area, Seiad and Collins-Baldy. The Seiad LSR (#353) occupies 12,779 acres of the analysis area (14%), and is located in the northwest corner of the area, taking in the Tompkins and upper Middle Creek drainages (see Figure 1-2 Management Areas). The Collins-Baldy LSR (#355) occupies 6,772 acres of the analysis area (8%) in the Mill, Singleton, Picnic, Coats, and Gumboot Creek drainages. The amount of late-successional habitat within the two LSRs is displayed in Table 3-25.

In addition to the large LSRs, there are eleven 100-acre LSRs within the analysis area. These small LSRs were designated in 1994 around all known NSO activity centers located outside of the large LSRs (within Matrix). The small LSRs consist of approximately 100 acres of the best habitat (not necessarily late-successional) around known sites.

Site Capability

Based on existing vegetation and areas identified as harsh sites in the Forest Plan, it is roughly estimated that 65% of the Lower Scott Analysis Area, within the Forest boundary, is capable of supporting dense, late-successional coniferous and coniferous-hardwood forest habitat. The remaining acres within the analysis area contain conifer vegetation on harsh sites, hardwood vegetation, montane shrub communities, meadow complexes, and non-vegetated areas (rock outcrops and water bodies).

Vegetative Condition

Current vegetative condition was evaluated using EUI in the GIS database. Components used to classify vegetative types included primary and secondary species component, size class, crown closure, and density class.

The total amount of late-successional forested habitat within the analysis area (within the Forest boundary) is approximately 32,930 acres; the amount of late-successional forest within the two LSRs in this analysis area is 7,050 acres. Additionally, there are approximately 18,250 acres of mid-successional forest (early-mature in the GIS database, 11-21 inches DBH), which may provide habitat for late-successional forest-related species.

The relatively wet climatic conditions for the majority of this century, combined with fire exclusion, have created changes in vegetative composition, structure, and pattern across the landscape. The vegetative composition in the mixed conifer zone has shifted from fire-adapted shade-intolerant conifers and hardwoods, to more shade-tolerant non-fire-adapted conifers. Stand structure within the mixed conifer zone has changed, with a more dense, shade-tolerant understory not only found on cooler north and east aspects, but also on normally more sparse south and west aspects (USDA, 1999).

As mentioned earlier, timber harvesting, road building, fire suppression, and natural disturbance events have affected late-successional habitat within the analysis area. Late-successional habitat currently occupies 37% of the land base within the Forest boundary. Mid-successional stands need to be assessed for continued development since they occupy an additional 21% of the land base. Early successional stands (pole and early mature stands, 7% of the land base) are also important for developing into future late-successional characteristics. Stand densities in the mid- and early successional component are important if continued development of late-successional habitat is desired in the future. Density has been shown to be an important factor within LSRs in this analysis area because of high and moderate levels of mortality that occurred during insect epidemics and due to the potential for large wildfires (USDA, 1999).

Within LSRs, drainages that contain a high proportion of dense, early, and mid-successional habitat include Hossick Gulch, Singleton Creek, Gumboot Creek, South Fork Mill Creek, upper Coats Creek, and scattered pockets in Tompkins Creek (refer to Figure 3-13. Early and mid-successional stands, documented as having two or more years of moderate to high levels of insect related mortality, occur in the following drainages: Hossick Gulch, Singleton Creek, Coats Creek, Gumboot Creek, Tompkins Creek, and McCarthy Creek (refer to Figure 3-9 Stands at Risk).

The existing late-successional and mid-successional forest habitats are fairly well distributed across the analysis area (see Figure 3-13, Seral Stages), with the exception of naturally drier sites (Townsend Gulch, McGuffy Creek, Swanson Gulch, Middle Lick, and New Barn Gulch), and large areas that burned in the 1987 wildfires (upper Tompkins Creek, Middle Creek, and Deep Creek). Although late-successional habitats are well distributed, they are naturally patchy due to the strong influences of aspect and topography. The more dense forest habitat is found on north and east aspects and in drainage bottoms. Past management has increased the patchiness (fragmentation) of the forested habitats. As mentioned above, approximately 9% of the analysis area has been harvested (clear cut and partial cut) and 312 miles of road have been constructed.

Key Question #1a - Which vegetative communities provide late-successional habitat?

The following is a general description of the major vegetative types currently found within the analysis area that provide, or have the potential to provide, late-successional habitat (see Figure 3-8 Existing Vegetation) (adapted from USDA, 1999). Percentages are based on land within the Forest boundary.

White Fir

This type generally occurs between 5,000 and 6,500 feet in elevation. This vegetation type can be found on all aspects but is more common on north- and east-facing slopes. This type occurs on approximately 8% (this is the percent of "true fir") of the analysis area. These stands are dominated by white fir with common associates of ponderosa pine, sugar pine, and Douglas-fir at the lower elevations. Common associates at the upper elevation zone include red fir and western white pine. Stands that are more open often contain shrubs such as manzanita, snowbrush, huckleberry oak, squaw carpet, Oregon grape, and Sadler oak. Natural gaps in these stands most often form from wind, lightning, insects, or disease. Many stands are densely stocked, and stagnation and mortality can become a severe problem.

Red Fir

Red fir occurs in minor amounts at high elevations in the analysis area. It is found in relatively pure stands at elevations above 6,000 feet, and is included in the 8% mentioned above for white fir. Sugar pine, white fir, and Douglas-fir are common overstory associates of red fir at its lower elevations or on southerly slopes. Mountain hemlock, Brewer's spruce, and/or western white pine commonly occur in this type at higher elevations or on northwest- to east-facing slopes. Shrubs, especially in dense red fir stands, rarely occur in this type. Wet meadows on glacial cirques commonly associate with the red fir type and mountain alder thickets dominate moist talus slopes, often mixed with other shrubs such as Rocky Mountain maple, mountain ash, and Oregon boxwood.

The true fir stands, red and white fir, vary from old, slow growing to young, vigorously growing. Some true fir stands are naturally very open. This is usually due to site characteristics associated with shallow, rocky soils or the occurrence of a high water table.

Reestablishment after major disturbance may be slow and may persist in a shrub stage for a long period. Generally, lower intensity fires allow for the conifers to better compete with shrub seedlings. High intensity fires tend to shift the vegetation toward shrub type, such as snowbrush or manzanita.

Mixed Conifer Zone

Mixed conifer stands make up 54% of the analysis area. There is usually no one dominant conifer species within most stands; however, four associations can be found in this watershed: hardwood/mixed conifer, pine/mixed conifer, Douglas-fir/mixed conifer, and white fir/mixed conifer. Conifer associates in all types are usually Douglas fir, ponderosa pine, sugar pine, Jeffrey pine, knobcone pine, incense cedar, and white fir. Hardwood components include canyon live oak, black oak, Oregon white oak, Pacific madrone, and chinquapin. Multi-layered stands containing a mixture of fire-tolerant and fire-intolerant species are common and are caused by a host of factors, including fire suppression and site conditions.

The pine/mixed conifer type generally occurs below 5,000 feet and is found on the xeric and drier mesic slopes, and in areas with lower annual rainfall in the eastern portion of the watershed. Douglas fir and white fir increase in dominance on north-facing, mesic slopes, higher elevations, and in areas of higher annual rainfall in the western portion of the watershed. This plant type has been most affected by fire suppression activities. Stands that were once dominated by shade-intolerant species, such as pine, have been encroached by shade-tolerant species over the last 80 to 100 years. The pine/mixed conifer type is associated with hardwoods such as dogwood, black oak, white oak, big leaf maple, and madrone. Chaparral species may occur in the understory layer.

The Douglas-fir/mixed conifer type can be found from the Scott River (about 1,800 to 2,000 feet) up to 6,000 feet in elevation. This is the most common vegetation type. White fir/mixed conifer types generally range from 4,500 to 6,000 feet. White fir is currently more prevalent than it was in the past, due to fire suppression activities. Hardwood associates with these vegetative types include canyon live oak on the poorer sites and black oak, chinquapin, and Pacific madrone on the better sites.

Other Communities

Other plant communities that occur in the analysis area, but do not contribute to the amount of late-successional forest habitat, include montane chaparral, montane meadows, hardwood/mixed conifer, upland hardwood forest, canyon live oak, Oregon white oak, and riparian vegetation. Meadow and riparian shrub occur on wetter sites. Natural meadows are more common at the higher elevations. All of these types include scattered conifers consisting of ponderosa pine, red fir, white fir, mountain hemlock, sugar pine, and Douglas fir.

Snags and Logs

Large (greater than 20 inches in diameter) CWM and snags are important and distinguishing features within late-successional forests. Many late-successional forest-related wildlife species are recognized as having strong associations with snags and CWM. The occurrence of CWM and snags in forest ecosystems is quite variable and can happen in a number of ways. Recruitment can occur slowly, resulting from mortality of individual, scattered trees, or it can happen in waves from disturbance events such as windthrow, fire, or insect and disease outbreaks. Retention of CWM is dependant upon fire frequency and intensity and on decomposition rates.

Table 3-26 (USDA, 1999) displays the average number of snags and CWM, per acre, taken from Forest inventory data. The figures are representative of the amounts that may be found in typical stands of late and mid-successional forest (dense or open stands) on the Forest. The numbers in parentheses represent the range of snags found during the inventory. The greatest occurrence of CWM and snags tends to be in true fir stands. This is primarily due to the fact that true fir stands, in general, are more dense (number of trees per acre) than mixed conifer stands and that the more frequent, less intense fire regime in the mixed conifer zones tend to consume more snags and CWM. The true fir forests tend to have more stand-replacing events that would carry higher levels of snags and CWM for a longer time period.

Table 3-26. Average Number Of Snags And CWM, By DBH, Per Acre By Forest Type And Seral S

Vegetation Type and Seral Classification	Number of Points	Snags 10-15"	Snags 15-20"*	Snags >20"*	CWM 15-20"	CWM >20"
WF/RF mid-dense	67	8.6 (1.6-19.2)	2.6 (0.4-6.0)	3.7 (0.9-11.0)	4.8	6.2
WF/RF late-dense	69	7.0 (0.0-13.0)	3.8 (0.0-8.0)	7.3 (1.5-17.6)	6.1	9.0
WF/RF mid/late-open	122	4.7 (0.0-23.2)	2.4 (0.0-8.8)	4.3 (0.5-12.0)	3.4	4.9
DF mid-dense	133	3.1 (0.0-9.0)	1.4 (0.0-6.0)	2.4 (0.0-6.2)	3.7	4.9
DF late-dense	133	3.6 (0.0-19.1)	0.6 (0.0-3.6)	3.3 (0.0-6.0)	3.4	8.3
DF mid/late-open	315	2.5 (0.0-18.8)	0.8 (0.0-8.0)	2.2 (0.0-15.0)	2.7	5.0
MC mid-dense	140	5.2 (0.6-12.4)	2.1 (0.0-6.2)	3.1 (0.5-15.0)	2.7	3.4
MC late-dense	138	5.8 (0.0-20.9)	2.0 (0.0-5.3)	4.3 (0.0-12.4)	3.4	6.5
MC mid/late-open	273	3.2 (0.0-20.7)	1.5 (0.0-17.3)	2.9 (0.0-9.5)	2.6	5.7

WF=white fir, RF=red fir, DF=Douglas fir, mid=mid-successional, late=late successional.

In order to provide habitat for species dependent on snags or large logs (e.g., woodpeckers, sapsuckers, swifts, fisher, marten, and amphibians), the Forest Plan contains direction that requires the following *minimum* retention levels for those habitat elements: 1) provide for an average of five snags per acre, in a variety of size and decay classes, in the landscape; 2) maintain snag densities through the full timber rotation by providing green replacement trees; 3) retain snags and replacement trees in clumps where possible; 4) retain snags with the largest DBH, as they tend to last longer and make the best habitat; 5) provide for a renewable supply of large down logs; 6) maintain 5 to 20 pieces of CWM per acre in various states of decay; and 7) leave large logs, sound and cull, of at least 20 inches diameter and about 40 cubic feet in volume when available.

LSR - 353 Seiad (USDA, 1999)

The entire Seiad LSR is approximately 101,200 acres in size, 12,779 acres (13%) of which are located within the Lower Scott Analysis Area. This discussion will include the entire LSR. The LSR is located on three Ranger Districts and encompasses several large drainages. Major drainages include: Tompkins Creek, Walker Creek, Grider Creek, the eastern portion of Elk Creek, Fort Goff Creek, lower portion of Portuguese Creek, Thompson Creek, and the eastern portion of the Indian Creek drainage. Elevations range from 1,500 to about 7,000 feet. The terrain is steep, and is dissected by sharp ridges and streams. The LSR has small parcels of private land located throughout; most of the parcels are located in the northern portion of this LSR along the Klamath River. Table 3-27, below, includes general information about the current condition of the Seiad LSR, information on percent lethal fire effects (see fire section) and acres of plantations are important for identifying potential treatments to develop or protect late-successional habitat in the LSR (refer to Steps 5 and 6). Data for the entire LSR was calculated using Forest wide LMP data (USDA 1999); data for the portion of the LSR in the Lower Scott Watershed was calculated using the EUI database.

Table 3-27. Status Sheet For Seiad LSR - #353.

Information	Entire LSR	LSR in WA
Total Acres	101,200	12,779
Acres Capable of Supporting Late-successional Forest Habitat	82,620	Approx. 8,450
Acres Currently Supporting Late-successional Forest Habitat	28,480 (LMP data, >25")	5,250 (EUI data, >21")
Percent of LSR Subject to Lethal Fire Effects	25	24
Acres of Plantation	14,610	2,000
Acres of Suitable NSO Habitat	49,730	3,757
Miles of Road	292.6	52.1
Average Road Density (miles/mile^2)	1.9	2.61

*Capable of supporting late-successional forest, but not necessarily northern NSO (NSO) habitat.

Table 3-28 highlights the general vegetative conditions for the Seiad LSR. Late-successional and mid-successional conditions account for 72% of the capable land base in the entire LSR. Plantations account for 18% of the capable land base. Within the Lower Scott Watershed, late and mid-successional conditions account for 76% of the capable land base; plantations account for 24% of the capable land base (Refer to Figure 3-9, Seral Stages).

Table 3-28. Vegetative Condition For Seiad LSR.

Vegetative Condition	Total Acres	Acres in WA
Late-successional forest	28,480 (LMP, >25")	5,250 (EUI, >21")
Mid-successional forest	31,040 (LMP, 11-25")	1,160 (EUI, 11-21")
Early-successional forest	14,640 (LMP, 6-11")	2,010 (EUI, 6-11")
Other	27,040	4,359
Total	**101,200**	**12,779**

The dominant plant community in the entire LSR is pine/mixed conifer. It accounts for approximately 42% of the land base. The Douglas-fir/mixed conifer, white fir/mixed conifer, and true fir types are also major components within the LSR. The other plant communities (oak woodlands, montane chaparral, meadows, etc.) account for minor percentages of the land base.

Insects and Disease

Observation flights have identified insect and disease related mortality in the LSR during the years 1993-1999. Areas affected by mortality over several consecutive years are at higher risk to stand-replacing events (wildfire or windthrow). The portion of the LSR within the Lower Scott Watershed has had high levels of insect related mortality on 770 acres and moderate levels of mortality on 3,293 acres (refer to Figure 3-7).

Fire and Fuels

Approximately half of the LSR consists of pine/mixed conifer typically located at the lower elevations. These areas primarily are more open with lower fuel loadings. Douglas fir and white fir/mixed conifer stands are generally located in the mid- and higher elevations and north slopes. These stands are denser and fuel loadings are heavier.

Forty-three percent of the LSR has burned in the recent past, with 41% being burned during the 1987 fire siege. Of the 12,779 acres of LSR within the Lower Scott Analysis Area, 37% (4,713 acres) burned in 1987. The fire risk for this LSR is rated as moderate, meaning that it can be projected that at least one fire will occur in 11-20 years per thousand acres. With a risk rating of moderate, the potential exists for 100 fire starts in the LSR during the next 20 years.

One particular area of concern for potential wildfire effects in this LSR is the acres in plantations. Plantations account for 14% of the land base within the LSR and 16% of the acreage within the Lower Scott Analysis Area.

NSO Critical Habitat

Overall, the Seiad LSR overlaps considerably with Critical Habitat Unit (CHU) CA 17 (Figure 3-14). The portion of the LSR in the Lower Scott Analysis Area is within CA 17; the Critical Habitat overlaps 97% with the LSR in the watershed. CHU CA 17 has connectivity objectives. CHU CA 17 functionally connects CHUs CA 21, 22, 23, and 25 with the Marble Mountain Wilderness.

LSR - 355 Collins Baldy (USDA, 1999)

The entire Collins-Baldy LSR is approximately 14,670 acres in size; 6,747 acres of which are located within the Lower Scott Analysis Area. This discussion will include the entire LSR. The LSR includes portions of the following drainages: Collins Creek, Kinsman Creek, Dona Creek, Everill Creek, Lime Gulch, Mill Creek, South Fork Mill Creek, Singleton Creek, Picnic Creek, Coats Creek, and Gumboot Creek. Elevations range from 2,000 to about 5,500 feet. The terrain is steep, and is dissected by sharp ridges and streams. The LSR is located on NFS lands, but is situated in checkerboard ownership. Every other section of land is in private ownership; the majority of private land is commercial timberland. The LSR covers a large amount of land but it is not contiguous. Table 3-29 includes general information about the current condition of the Collins-Baldy LSR, information on percent lethal fire effects (see Fire Management Section) and acres of plantations are important for identifying potential treatments to develop or protect late-successional habitat in the LSR (refer to Steps 5 and 6). Data for the entire LSR was calculated using Forest Plan data (USDA, 1999); data for the portion of the LSR in the Lower Scott Watershed was calculated using the EUI database.

Table 3-29. Status Sheet For Collins-Baldy LSR.

Information	Entire LSR	LSR in WA
Total Acres	14,670	6,747
Acres Capable of Supporting Late-successional Habitat	12,960	Approx. 4,152
Acres Currently Supporting Late-successional Habitat	1,630 (LMP data, >24")	1,772 (EUI data, >21")
Percent of LSR Subject to Lethal Effects	15	8
Acres of Plantation	1,551	315
Acres of Suitable NSO Habitat	9,100	1,770
Miles of Road	75.3	35.0
Average Road Density (mi/mi²)	3.3	3.3

*Lands capable of supporting late-successional habitat, but not necessarily NSO habitat.

Table 3-30 highlights the general vegetative conditions for the Collins-Baldy LSR. Late-successional and mid-successional conditions account for 71% of the capable land base within the entire LSR. Plantations account for 12% of the capable land base. Within the Lower Scott Watershed, late and mid-successional conditions account for 91% of the capable land base within the LSR; plantations account for 8% of the capable land base (Refer to Figure 3-13, Seral Stages).

Table 3-30. Vegetative condition for Collins-Baldy LSR.

Vegetative Condition	Total Acres	Acres in WA
Late-successional forest	1,630 (LMP data, >25")	1,772 (EUI data, >21")
Mid-successional forest	7,520 (LMP, 11-25")	2,003 (EUI, 11-21")
Early-successional forest	2,980 (LMP, 6-11")	377 (EUI, 6-11")
Other	2,630	2,595
Total	**14,670**	**6,747**

The dominant plant community in this LSR is also pine/mixed conifer. It accounts for approximately 67% of the land base. The Douglas-fir/mixed conifer, white fir/mixed conifer, and non-commercial or "other" vegetation types are also major components within the LSR. The other plant communities account for minor percentages of the land base.

Insects and Disease

Observation flights have identified insect and disease related mortality in the LSR during the years 1993-1999. Areas affected by mortality over several consecutive years are at higher risk to stand-replacing events (wildfire or windthrow).

Mortality was located throughout the LSR during the observations. High elevation true fir and mixed conifer stands on all aspects appeared to be affected. At the lower elevations, ponderosa pine and Douglas fir were the primary species affected. The fir engraver beetle, western pine beetle, and pine engraver beetle have been the primary insects responsible for the various levels of mortality throughout this LSR. Douglas fir has also been heavily impacted by dwarf mistletoe in the Mill Creek drainage. Most recently, the portion of the LSR within the Lower Scott Watershed has had high levels of insect related mortality on 62 acres and moderate levels of mortality on 1,668 acres (refer to Figure 3-7).

Vegetative Functioning

Late-successional habitat is lacking in this LSR, with 13% of capable land in late-successional condition. Portions of the LSR in the vicinity of Scott Bar and Mill Creek were impacted by timber harvest during the years of heavy mining activity (late 1800s). More recently, timber harvest on Forest Service and private commercial timberland has reduced late-successional habitat within and adjacent to the LSR. Past timber harvest has resulted in high percentages of dense, early and mid-successional forest within the LSR. Dense stand conditions and stand stagnation in the early and mid-successional stages are evident throughout the LSR. The high and moderate levels of mortality that occurred within the LSR in early 1990s compound the overstocking problem.

Fire and Fuels

This LSR has one of the highest fire risks of all the LSRs on the Forest (USDA, 1999). The risk is high, but the majority of the area has good access and fires can be contained relatively easily. A primary concern for fire risk is the adjacent private lands. The checkerboard ownership pattern makes managing for fuels across the landscape more complicated. Given the stand density and mortality in the LSR, continued build-up of fuels, and difficulty in managing fuels across the landscape, the risk of a wildfire is compounded.

NSO Critical Habitat

The Collins-Baldy LSR overlaps almost completely with CHU CA-16; within the Lower Scott Watershed, there is complete overlap. This unit has two primary objectives: first, to extend habitat eastward as far as possible toward CA-1 on the Goosenest Ranger District (connectivity); and second, to provide habitat for five nesting pairs of NSO. Included in the designation of CA-16 is an acknowledgment of the discontinuous nature of habitat conditions presented by the intermingled private and federal ownership of land.

Key Question #1b - Which vegetative communities are capable of providing late-successional habitat in the future?

Mid-Successional Stands

Mid-successional forest occupies 18,250 acres (21%) within the analysis area. These stands may currently provide habitat for late-successional forest-related species, and will be important in maintaining late-successional habitat for the future (refer to Figure 3-13, Seral Stages). Currently, dense, mid-successional stands are scattered throughout the watershed, most notably in Canyon Creek, Boulder Creek, Mill Creek, Scott Bar Mountain, and within the Collins-Baldy LSR. Overstocked stands stagnate and prevent the further development of late-successional conditions. In addition, overstocked stands pose a greater fire risk than more open stands.

Plantations

Well-stocked plantations account for approximately 7% (5,868 acres) of the analysis area within the Forest boundary. Of that, approximately 3,924 acres are less than 15 years of age, 843 acres are between 15 and 30 years, and 1,101 are over 30 years of age (refer to Figure 3-8, Existing Vegetation). The majority of plantations less than 30 years old consist of the mixed conifer vegetative type. Plantations tend to be mostly even-aged with very little structural diversity; most trees within plantations are vigorous and healthy. As the stands mature, they tend to become very dense with a slowing of growth. Plantations greater than 30 years old become very dense and show signs of declining growth rates.

Key Question #2 - Where does connectivity of late-successional habitats occur within and between LSRs? Where are the barriers to dispersal?

The ability to move across the landscape may be important to the long-term persistence and viability of some wildlife species. It may be particularly important to late-successional habitat associated species. The movement or dispersal of these species across the landscape is provided by large blocks of late-successional habitat in the LSRs and through management objectives and various land allocations between LSRs. Those management objectives and land allocations include: RRs, administratively withdrawn areas, management prescriptions, retention of old-growth fragments in Matrix, and 100-acre LSRs.

As defined in the Klamath LRMP EIS (USDA, 1994a), connectivity is a measure of the extent of which the landscape pattern of the late-successional and old-growth ecosystem provides for biological and ecological flows that sustain late-successional and old-growth associated animal and plant species across the range of the NSO. Connectivity does not necessarily mean that late-successional and old growth areas have to be physically joined in space, because many late-successional species can move (or be carried) across areas that are not in late-successional ecosystem conditions. In their conservation strategy for the NSO, the Interagency Scientific Committee (ISC) did not designate discrete habitat corridors (Thomas, 1990). It was determined that entire landscape mosaics rather than the size or shape of individual habitat patches are important to owls. As a result, the ISC's conservation proposal included guidelines for maintaining a "well managed landscape matrix" surrounding habitat conservation areas.

Connectivity

In the Forest wide LSR Assessment (USDA, 1999), connectivity between LSRs and LSR/wilderness complexes was assessed based on two considerations, the distance between LSRs and LSR/wilderness complexes, and the amount of dispersal habitat between LSRs and LSRs/wilderness complexes.

Using the distance criteria, connectivity between LSRs across the entire Forest rates "very strong" (less than six miles on the average between LSRs). Within the Lower Scott Analysis Area, connectivity between LSRs is also very strong, with less than six miles between Seiad LSR, Collins-Baldy LSR, and the wilderness.

In the Forest wide LSR Assessment, the assessment of dispersal habitat between LSRs/wilderness included several steps. The Forest was stratified by analysis watersheds. Forest analysis watersheds were chosen over quarter townships because they are the basis for other Forest analyses (such as this ecosystem analysis). In addition, they are partially defined by prominent landscape features that may have some relationship to how dispersing animals move through a landscape. Only those areas that are capable of providing dispersal habitat were included in the assessment. Capability was determined from Order 3 soil survey information. Dispersal habitat was defined as dense, mid-successional, and late-successional coniferous forested stands (greater than or equal to 11 inches DBH and greater than or equal to 40% canopy closure). A distinction was made between "other reserves" and "Matrix lands." Although Matrix lands are those from which scheduled timber harvest is derived, they do provide and will continue to provide dispersal habitat. Analysis watersheds having less than 50% in dispersal habitat may trigger formal consultation with US Fish and Wildlife Service (USFWS) for any projects that propose the removal of habitat.

From the dispersal habitat assessment, Table 3-31 displays the amount of dispersal habitat (as a percent of capable ground) connecting the LSRs that overlap the analysis area to each other and to the Marble Mountain Wilderness Area.

Table 3-31. Dispersal Habitat Between LSRs and Wilderness Within The Lower Scott Analysis Area.

Analysis Watershed	Total capable acres between LSRs and Wilderness	Acres of dispersal habitat in other reserves	Acres of dispersal habitat in Matrix	Total dispersal habitat acres (% Of capable)
Lower Scott	25,450	3,300	12,270	15,570 (61%)

As displayed above in Table 3-x, the Lower Scott Watershed provides a moderate to high level (61% out of 100%) of dispersal habitat overall. Dispersal habitat is limited in areas that were affected by the 1987 wildfires and salvage logging (Middle and Deep Creeks).

LSR - 353 Seiad

The distribution of late-successional habitat throughout this LSR is good overall (USDA, 1999). There are relatively large (one thousand to several thousand acres), contiguous stands of late-successional habitat in most of the major drainages outside of this analysis area, including upper Thompson Creek, Fort Goff Creek, Grider Creek, and O'Neil Creek. Within the analysis area, however, the 1987 wildfires and subsequent salvage logging impacted the upper reaches of Tompkins Creek drainage. This area is currently in an early to mid-successional condition in most areas and provides limited dispersal habitat. Remaining patches of late-successional habitat are scattered throughout this portion of the LSR; the largest blocks of late-successional habitat are located in the lower two forks of Tompkins Creek.

Given its size and juxtaposition to the Marble Mountain Wilderness, the Seiad LSR plays an important role in providing a large refugia for late-successional associated species. Habitats within the LSR are well connected with the Marble Mountain Wilderness through Cliff and Grider Valleys (outside of the analysis area). The LSR is bordered by the Marble Mountain Wilderness at its southern boundary. An estimate of NSO habitat within the Marble Mountain Wilderness (USDA 1999) indicates that 50,220 acres of nesting/roosting habitat and 26,830 acres of foraging habitat occur there. The combined habitat within the LSR and the adjacent wilderness area enable this area to function as large refugia for multiple pairs of NSO. Overall, distribution and connectivity of late-successional habitat within the LSR was rated as moderate in the Klamath Late-Successional Reserve Assessment (USDA, 1999).

LSR - 355 Collins Baldy

There are few remaining large stands of late-successional forest habitat in this LSR. Stands that do exist are patchy. Overall, distribution of late-successional habitat throughout the LSR is weak. Dense mid-successional stands and pole stands comprise most of the forested area in this LSR. Stands of dense mid-successional habitat intermixed with remnant older stands provide some connectivity; however, pole stands and habitat conditions on adjacent private land reduce connectivity in this LSR. The checkerboard ownership pattern will limit the distribution, amount, and quality of habitat for late-successional species. Private commercial timberlands will not pose absolute barriers to dispersal and movement of late-successional forest-related species due to the general use of uneven-aged timber harvest practices. This method of harvest provides for patches of older forest intermixed with younger forest and provides other habitat components such as snags and CWM. Overall, the distribution and connectivity of late-successional habitat in the Collins-Baldy LSR is rated as low in the Forest wide LSR Assessment (USDA, 1999).

Riparian Reserves

RRs generally include aquatic ecosystems and the adjacent upland areas. RRs have been established for the following purposes: 1) to maintain and restore riparian structure and function to benefit riparian-dependent and associated species other than fish; 2) to enhance habitat conservation for organisms that are dependent on the transition zone between upslope and riparian areas; 3) to improve travel and dispersal corridors for many terrestrial plants and animals; and 4) to provide for greater connectivity of the watershed. The RRs will also serve as connectivity corridors between the LSRs.

Riparian areas provide a diversity of vegetative communities and conditions that are important to a wide variety of mammals, birds, amphibians, fungi, mollusks, reptiles, insects, and fish. The adjacent forested upland is also important for many species, including late-successional forest species, such as NSO, goshawks, fisher, and marten. The riparian shrub, conifer forest, and accumulations of downed material within RRs provide travel and dispersal corridors for late-successional forest-related species between blocks of suitable habitat and between LSRs.

Within the Lower Scott Analysis Area, approximately 11% (9,550 acres) of the NFS land base is designated as RR using the Forest Plan database and the updated RR layer (refer to Aquatics Step 3). Over half of the acres that would be designated as RR fall within, and are masked by (not included in 10%), other land allocations (e.g. LSR) or by Congressionally or administratively withdrawn land allocations (e.g. wilderness). Of the RR acres in the Matrix, some areas have been degraded by management activities, prior to RR designation, or by wildfire. Past timber harvest has resulted in early seral conditions on approximately 859 acres of RR. This is roughly 9% of the land base within RRs. Development of plantations through thinning and stand maintenance would increase the amount of RR acreage available for dispersal of organisms for the long-term.

Connectivity between large LSRs is facilitated by RRs that are currently in a late- or mid-successional forest condition. The following creeks and drainages currently support some percentage of late-successional or mid-successional forest and are important for connectivity across the watershed to other blocks of late-successional habitat (stepping stones of habitat): 1) connectivity between the Seiad and Collins-Baldy LSRs is provided, to some extent, by Bill Berry Creek, Muck-a-Muck Creek, George Allen Gulch, McGuffy Creek, Wooliver Creek, Pat Ford Creek, and Hossick Gulch; 2) connectivity between Seiad LSR and the Marble Mountain Wilderness Area is provided by habitat in Kelsey Creek, Canyon Creek, and Boulder Creek; and 3) connectivity is provided from the Marble Mountain Wilderness Area to Collins-Baldy LSR by the Canyon Landscape and small patches of habitat on the north slope of Scott Bar Mountain, Big Ferry Creek, Little Ferry Creek, and Pat Ford Creek.

Barriers to Dispersal

Within the Lower Scott Analysis Area, the potential barriers to dispersal for late-successional forest-related species would include areas that currently do not support late-successional or mid-successional forest. Non-forested patches on the landscape would not, however, pose absolute barriers for highly mobile species, such as owls, goshawks, fisher, or marten. For smaller species with limited mobility; such as salamanders, mollusks, or even plants; non-forested areas can pose barriers to dispersal, as can roads and the Scott River. Areas in the landscape that may pose barriers to dispersal, or that may discourage movement of more mobile species, include the following: large areas burned in the 1987 fires (such as upper Tompkins Creek, Middle Creek, and Deep Creek); large areas of drier, ultramafic soils in the Swanson Gulch, and Scott Bar Ponds areas; the Scott River corridor including Scott River Road; heavily harvested private timber ground on the eastern boundary of the analysis area; and the eastern portion of the analysis area where the more open pine stands graduate into the agricultural lands of the Scott Valley.

Key Question #3 - What is the current density of roads in the analysis area and within LSRs?

The effects of roading on the landscape are similar to those of timber harvest. Roading contributes to increased fragmentation of vegetation by dividing patches into smaller fragments. The location of roads on the landscape has a significant effect on landscape continuity and connectivity. Roads can function as both barriers to dispersal and corridors for movement; roads may restrict landscape movement of fire and some wildlife species, while at the same time providing travel corridors for predators and humans.

Forman (1995) showed how various species are affected by the width of roads. Surface arthropods, such as Wolf spiders and beetles, almost never cross a lightly traveled, six meter (20 feet) wide paved road. Small animals cross lightly traveled roads of 6-15 meters (20-49 feet) width, less than 10% of what is normal for movements within the adjacent habitat. Mid-sized animals crossed road corridors up to 15 meters (49 feet) wide, but not 15-30 meters (49-98 feet). Large animals crossed most roads, but the rate of crossing is typically lower than movement rates in unroaded habitat. Habitat patterns are, therefore, critical to species movements and appropriate management of the landscape must consider how changing habitats will affect the ability of species to operate in ways necessary for their survival (Gosz, et al., 1997).

The current total road density within the Lower Scott Analysis Area is displayed on Figure 3-15 Road Density, and varies from zero miles per square mile to greater than four miles per square mile. Average total road density within the Seiad LSR is 1.9 miles per square mile; average total road density within the Collins-Baldy LSR is 3.3 miles per square mile. Roads can affect ecosystems in several ways. Road construction removes and fragments habitat, affects wildlife distribution and movements, and increases the potential for outside disturbance factors. Knowledge regarding specific effects of roads is limited, however. It is not known how adaptable most populations are to habitat alterations. Also, it is not known how adaptable most populations are to disturbance, although regular ongoing use of roads for forest management activities seems to be less disruptive than intermittent use (USDA, 1999).

It is difficult to determine thresholds for what acceptable road densities may be. Some investigations into effects of roads on deer and elk suggest that general use of habitat decreases from moderate to low at between 2 to 3.5 miles of open road per section (Brown, 1985). Habitat models in the Forest Plan (Appendix I) suggest that habitat capability for marten and fisher is reduced to low when open road densities exceed 3 miles per square mile.
In the Lower Scott Analysis Area, areas with total road density (including closed roads) greater than four miles per square mile are of highest concern for habitat fragmentation and disturbance to wildlife. These areas should be identified as priority areas for road treatments and decommissioning (refer to Appendix E, Access and Travel Analysis).

Key Question #4 - What is the current management emphasis on private lands adjacent to LSRs?

Private commercial timberland occupies 23% of the Lower Scott Watershed. Approximately 9,000 acres are located outside of the Forest boundary along the eastern edge of the analysis area; the Forest GIS database does not have vegetation data for the private land outside of the Forest boundary. The majority of the private commercial timberland within the Forest boundary is located in a checkerboard pattern, intermixed with sections of NFS land designated as the Collins-Baldy LSR (refer to Figure 1-2, Management Areas). Land management emphasis on privately owned land is long-term management of timber lands, using even and uneven-age management, for maximum production of high quality forest products while maintaining and enhancing other forest resources such as water quality and wildlife habitats (C. Brown and S. Farber, personal communication, 1999).

Currently, on private lands within the Forest boundary, there are 1,542 acres of early successional forest, 8,492 acres of mid-successional forest, and 3,898 acres of late-successional forest. Timber harvest on private land is expected to reduce late-successional habitats and promote early and mid-successional stages of forest habitat. Harvest techniques generally consist of uneven-aged management; therefore, pockets of late-successional forest will remain intermixed with younger seral stages. Other important elements of late-successional habitat are also maintained, such as CWM and large snags.

Terrestrial Wildlife

Species identified for analysis in these watersheds include: bald eagles, NSO, northern goshawks, fisher, marten, willow flycatchers, western pond turtles, red tree voles, bats, terrestrial salamanders, mollusks, peregrine falcons, deer, elk, bear, turkeys, Forest Service Sensitive plants, and SM plants.

Key Question #1 - For the species identified in this analysis, what are the habitat needs?

Key Question #1a - Where is the habitat for these species and how much habitat is in the analysis area?

Key Question #1b - What is our current knowledge of the populations in this analysis area?

The analysis area contains potential habitat for a variety of vertebrate wildlife and plants. Many of these habitats have been altered by land use activities (e.g. mining, grazing, timber harvest, and road building) or major disturbance events on public and private land. For this analysis, the focus will be on the species listed above. These species were selected for analysis because of their status as protected by the ESA, their status as Forest Service Sensitive, their status as SM species, their inclusion in the Forest Plan as Forest Emphasis Species, or their inclusion due to local interest. Some of these species are also included as part of the Species Associations identified in the Forest Plan.

Species Associations from the Forest Plan that are found in the analysis area, but that are not being specifically addressed in this document, include the following: snag habitats, hardwood associations, riparian habitats, down woody material, cliffs, caves, talus, and meadows. Information developed and tracked in the analysis, including late-successional habitats and habitats associated with species being specifically addressed, will include discussions of habitat concerns for those Species Associations.

Threatened and Endangered Species

Bald Eagle: *Federal Threatened*

Bald eagles in inland northern California are found in close association with lakes, reservoirs, and rivers that provide prey and suitable nesting and roosting habitat. Nests are usually located in multistoried forest stands with large trees; generally the largest ponderosa pine, sugar pine, or Douglas fir trees are used for nest and roost sites. Bald eagles feed primarily on fish during the spring and summer, but often shift to waterfowl and carrion in the winter. Nesting territories are usually associated with lakes, reservoirs, rivers, or large streams and are usually within two miles of water bodies that support adequate food supply (Lehman, 1979; USDI, 1986). Bald eagle nests are usually located in uneven-aged, multi-storied stands with old growth components (Anthony et al., 1982).

No bald eagle nests have been identified along the Scott River or within the Lower Scott Analysis Area to date. The nearest bald eagle nest site is located along the Klamath River at Caroline Creek, approximately eight miles northwest. Bald eagles have been documented on four different occasions (twice in 1992, once in 1994, and once in 1996) during the summer months along the Scott River in the vicinity of Isinglass and Snow Creeks, just east of the Forest boundary (on private land). Although this may indicate a nearby bald eagle nest site, there have been no systematic nest searches conducted in the area and no eagle nest sites have been incidentally located in this area.

Bald eagles are common in Scott Valley during migration and winter months. Wintering habitat is associated with open bodies of water that can be found along the Scott River. Within the analysis area, wintering bald eagles have often been seen foraging along the Scott River between Kelsey Creek and Isinglass Creek.

Northern NSO: *Federal Threatened*

Northern spotted owls (NSO) are associated with late-successional coniferous forest. Local suitable nesting and roosting habitat is defined as: 1) Klamath mixed conifer, Douglas-fir, and true fir stands below 6,000 feet in elevation; 2) with an overstory of Douglas-fir, ponderosa pine, sugar pine, incense cedar, white fir and/or Shasta red fir, averaging or above 18 inches in diameter; 3) an understory composed of the same conifer species with hardwoods; 4) a total canopy cover of 60-100%; 5) a minimum of two to five snags per acre (18 inches or greater in diameter) and two to five down logs per acre (18 inches diameter at large end); 6) the presence of deformed trees (mistletoe, heart rot, etc.); and 7) sufficient open spaces below the canopy for owls to fly (Klamath National Forest unpublished report, 1993).

For this analysis, suitable habitat was defined using the EUI database on the Forest. Specific designators from EUI (e.g. size class) did not fit the definition above and had to be redefined. Therefore, suitable NSO habitat using EUI is defined as: conifer forest below 6,000 feet in elevation; total tree cover greater that 60%; primary species are conifers; secondary species are conifers, black oak, madrone, canyon live oak, or chinquapin; size classes include 4 and 5 (averaging 21 inches DBH or greater), and size class 3 (11 to 21 inches DBH) with predominants (trees remaining from previous stand that are greater than 36 inches DBH).

Foraging habitat is somewhat more difficult to classify, as NSO are known to use a wide variety of habitats and openings for foraging. For this analysis, a foraging component was added to the EUI definition of suitable habitat to include stands on north and east aspects that are somewhat more open (average tree cover between 40 and 59%) and that have the larger tree component consisting of conifers and hardwoods (size classes 3, 4, and 5). These stands are usually intermixed with nesting habitat (as defined above) and may provide important foraging habitat associated with nest sites. Foraging habitat as defined here is a very conservative estimate. It does not include all potential foraging habitats (e.g. riparian areas, natural and man-made openings, plantations, and sparse stands).

Currently, there are a total of 28,028 acres of suitable NSO habitat within the analysis area inside the Forest boundary (refer to Figure 3-16, Suitable Habitat for NSO). Table 3-32 displays acres of suitable habitat by management area within the Lower Scott Analysis Area.

Table 3-32. Suitable NSO Habitat by Management Area.

Management Area	Acres of Suitable Owl Habitat
Seiad LSR	3,757
Collins-Baldy LSR	1,770
100-Acre LSRs	867
Sensitive Species Habitat	218
Wilderness	6,881
RR	3,570
Recreational River	463
Scenic River	465
Retention	352
Partial Retention	5,586
General Forest	1,477
Private land w/in boundary	2,622
Totals	**28,028**

NSO Activity Centers

NSO surveys have been conducted in the Lower Scott Analysis Area since 1980 for various management activities. During the 1980s, NSO were a species of concern and were added to the Regional Sensitive Species list. Surveys conducted prior to 1988 were done without an approved protocol; they were conducted along existing roads using similar calling techniques as those used with the current protocol.

Surveys conducted after 1988 were done according to the 1988 NSO Inventory and Monitoring Handbook and were conducted as part of the Research, Development, and Application (RD&A) Program or for timber sales. Early RD&A surveys were conducted in NSO Habitat Areas (SOHAs) and in Random Sample Areas (RSAs).

Surveys conducted since 1991 have been done according to the March 12, 1991, Regional Survey Protocol. Protocol surveys using the most recent protocol have been conducted in proposed timber sale or project areas, Habitat Conservation Areas (Thomas et al., 1990), in known NSO activity centers, and in LSRs (since 1994).

The entire Lower Scott Watershed has been surveyed for owls to some extent, with the exception of portions of the Marble Mountain Wilderness (three RD&A sites in wilderness). The survey effort in this watershed is summarized below in Table 3-33.

Table 3-33. NSO Survey History for the Lower Scott Watershed.

Survey Area	Reason for Survey	Survey Years
Canyon Landscape: (Boulder, Canyon, Kelsey)	Oxb/Upper Boulder TS Up-Willies TS Up-Willies + Upper Boulder Canon Timber Sale Area	6 visits 1991 6 visits 1993 3 visits 1994 1995, 1996, 1997, 1998, 1999
Seiad LSR-353: Scott River portion	SOHA surveys HCA surveys Canon TS related surveys Owl activity center surveys	1985-1989 1990, 1991 1995, 1996 1997
Scott Bar Mountain	Cove Timber Sale Upper Boulder TS Scott Bar Mt. Underburn Scott Bar Mt. Salvage	1989-1990 1991 and 1994 1992-93, 1996 1998

Table 3-33. NSO Survey History for the Lower Scott Watershed.		
Survey Area	**Reason for Survey**	**Survey Years**
Guffy Planning Area: (McGuffy, Bill Berry, Muck-a-Muck)	Swanson Planning Area Guffy Timber Sale Guffy Underburn	1992 1993-1994 1999
Franklin Planning Area: (Franklin and Middle Lick)	RSA surveys Franklin Planning Area Private Timber Company Lick Timber Sale	1988-1991 1991-1992 1993-1995 1995-1996
Collins-Baldy LSR-355: Scott River portion	SOHA surveys HCA surveys Owl activity center surveys Surveys by private landowners	1983-1990 1991 1992-1997 Ongoing
Wooliver Planning Area: (Wooliver, Pat Ford, Big Ferry)	Wooliver TS Wooliver/Franklin Planning Woover TS	1991 1992 1993
Wilderness: (Canyon, Spirit Lake, Wooley)	Canyon Creek SOHA Spirit Lake RSA Wooley Creek RSA	1989-1991 1989-1990, 1997 1990

TS=Timber Sale. LSR=Late-Successional Reserve. HCA=Habitat Conservation Area. SOHA=NSO Habitat Area. RDA=Research, Development and Analysis Sites.

Surveys in the Lower Scott Analysis Area, as displayed in Table 3-33, have been comprehensive and fairly consistent over the past decade. All suitable habitat outside of wilderness has been surveyed, and it can be assumed that all potential NSO activity centers outside of wilderness have been identified. It can be expected that the location of activity centers will vary in the landscape over time, but the number of activity centers will remain fairly constant for the short-term. As late-successional habitat develops in previously burned areas (Tompkins and Deep Creeks), additional activity centers may be found. NSO surveys over the past decade have identified 25 NSO activity centers within the watershed. The activity centers are listed in Table 3-34, along with the total amount of suitable habitat in each core area (0.7-mile radius), the amount of habitat within each homerange (1.3-mile radius), and the management area in which the activity center falls.

At the project-level, suitable habitat is often assessed using more site-specific information, and therefore, suitable habitat figures reported in project-specific documents may differ from Forest-scale based results as displayed here. In cases where homeranges have been calculated during project-level analysis, including ground verification, it has been substituted for Forest-level data reported in the homerange table (Table 3-34). For NSO activity centers without site-specific analysis, homerange acreages for this analysis were estimated using the EUI coverage. Homerange estimates are based on the EUI definition of suitable habitat described above.

Table 3-34. Acres Of Suitable NSO Habitat and Forest Management Area For Owl Activity Centers.			
Activity Center	**Habitat within Core Area (0.7)**	**Habitat within Homerange (1.3)**	**Management Area**
KL-1111	241	638	Seiad LSR
KL-4189	387	1097	100-Acre LSR
KL-0255	338	864	100-Acre LSR
KL-0105	312	1067	Private/LSR
KL-2104	381	881	Collins-Baldy LSR
KL-2106	78	554	Collins-Baldy LSR
KL-2107	288	969	Collins-Baldy LSR
KL-0249	172	639	100-Acre LSR
KL-0298*	281	1176	100-Acre LSR
KL-4095*	476	1256	100-Acre LSR
KL-0248*	393	1294	100-Acre LSR
KL-4085	878	2341	Wilderness
KL-0354*	412	1600	Matrix
KL-2108	254	541	Collins-Baldy LSR
KL-0094*	451	1453	100-Acre LSR
KL-0353	662	1735	Matrix
KL-1110	415	1295	Seiad LSR
KL-1109	561	1291	Seiad LSR
KL-1100	399	1405	Seiad LSR
KL-4099	444	922	Seiad LSR
KL-0247*	424	1124	100-Acre LSR
KL-0098*	374	1215	100-Acre LSR
KL-4097*	297	868	100-Acre LSR
KL-0096*	133	955	100-Acre LSR
SK-365	ID by Private 1996, in Schuler Gulch Sec.6		Matrix
*Suitable habitat within homeranges calculated during project specific analysis.			

Analysis of the amount of suitable habitat within NSO core areas and homeranges is important when consulting with the USFWS on individual projects that may affect NSO habitat. In order to avoid "take" of NSO through removal of habitat, as defined in the ESA, timber harvest projects occurring in the vicinity of owl activity centers should maintain 50% (500 acres) of the core area in suitable habitat (approximately 0.7-mile radius) and 40% (1,360 acres) of the homerange (1.3-mile radius) in suitable habitat. Projects that are occurring in homeranges that are below this threshold, or that will take the core area or homerange below this threshold, are in a situation where take may occur and must undergo formal consultation with USFWS.

LSR - 353 Seiad

The entire Seiad LSR provides approximately 26,240 acres of nesting/roosting habitat and 23,490 acres of foraging habitat, for a total of 49,730 acres of suitable NSO habitat (as defined in the Forest Wide LSR Assessment, USDA, 1999). An additional 24,910 acres have the potential of providing suitable NSO habitat in the future (e.g., plantations). Table 3-32, Suitable NSO Habitat by Management Area, displays the amount of habitat in the Seiad LSR (as defined using EUI) that falls within the Lower Scott Analysis Area.

Much of Seiad LSR has never been adequately surveyed for NSO (at least 40%). However, the portion of the LSR that is within the analysis area has been surveyed several times (refer to Table 3-33, NSO survey history for the Lower Scott Watershed). To date, a total of 25 NSO activity centers have been located within the boundary of the LSR, five of which are located within the analysis area. Table 3-34, Acres of Suitable NSO Habitat and Management Areas for Owl Activity Centers, summarizes habitat within core areas and homeranges for all of the owl activity centers within the Lower Scott Analysis Area.

LSR - 355 Collins Baldy

The entire Collins-Baldy LSR provides approximately 4,600 acres of nesting/roosting habitat and 4,500 acres of foraging habitat, for a total of 9,100 acres of suitable NSO habitat (as defined in the Forest Wide LSR Assessment, USDA, 1999). An additional 2,930 acres could potentially provide NSO habitat in the future (e.g. plantations, dense early or mid-successional stands). Table 3-32, Suitable NSO Habitat by Management Area, displays the amount of suitable habitat in the Collins-Baldy LSR that falls within the Lower Scott Analysis Area.

There are 13 NSO activity centers that have been located within the boundary of Collins-Baldy LSR, five of which are located within the Lower Scott Analysis Area. One of the activity centers, KL-0105, has been located on private land with some associated detections occurring on public lands. The entire LSR has been surveyed for NSO over the years. Between 1990 and 1992, the entire LSR was surveyed to protocol. Survey effort for the portion of the LSR within the Lower Scott Analysis Area is summarized in Table 3-33, NSO survey history for the Lower Scott Watershed. Table 3-34X, Acres of Suitable NSO Habitat and Management Areas for Owl Activity Centers, summarizes habitat within core areas and homeranges for all of the owl activity centers within the Lower Scott Analysis Area.

NSO Critical Habitat

Two NSO CHUs, as identified by the USFWS, overlap with the Lower Scott Analysis Area (CA-16 and CA-17). The majority of Critical Habitat in the analysis area is contained within the Seiad and Collins-Baldy LSRs. Critical Habitat overlaps 98% with the LSRs in the analysis area, leaving approximately 422 acres (out of 18,573) in the Matrix. This relatively small amount of Critical Habitat outside of LSRs is located near a ridge on the northern edge of the Middle Creek drainage and below Tom Martin Peak at the head of the McGuffy Creek drainage (refer to Figure 3-14, Critical Habitat for NSO, and Figure 1-2, Forest Plan Management Areas). These slivers of Critical Habitat in the Matrix follow the boundary the Seiad LSR and may have been mapping discrepancies caused by differences in map scale from the original Federal Register designation of Critical Habitat to the interpretation at the watershed scale. The parcels of Critical Habitat in the matrix include 37 acres of suitable NSO habitat, none of which are located within the homerange (1.3 miles) of a known owl.

Forest Service Sensitive Species

Northern Goshawk: *Forest Service R-5 Sensitive*

Goshawks can be found in middle and higher elevation mature coniferous forests, usually with little understory vegetation and flat or moderately sloping terrain. Moderate and high quality habitats contain abundant large snags and large logs for prey habitat and plucking posts (Hall, 1984). Goshawks generally breed in older-age coniferous, mixed, and deciduous forest habitats. This habitat provides large trees for nesting, a closed canopy for protection and thermal cover, and open spaces allowing maneuverability below the canopy (Hall, 1984).

Within the analysis area, habitat consists of mid- and late-successional mixed conifer forest with scattered harvested and natural openings. On the west side of the Forest, suitable goshawk habitat is similar to NSO habitat. For this analysis, it will be described as the same. Approximately 28,028 acres of suitable habitat currently exist in the analysis area. For a display of suitable goshawk habitat, (see Figure 3-16, Suitable Habitat for NSO). For the amount of suitable goshawk habitat in the watershed by Management Area, see Table 3-32, Suitable NSO Habitat by Management Area.

There are eight goshawk activity centers within the analysis area. Four of the eight sites are associated with NSO nest sites. Known goshawk sites were detected incidentally during NSO surveys or during timber sale reconnaissance. Five of the goshawk sites were designated as Goshawk Management Areas (GMAs) in the Forest Plan. The other three sites are located within the Matrix (Canyon Creek, Kelsey Springs, and Deep Lake Creek). All eight sites have been surveyed to some extent, although South Fork Mill Creek and Canyon Creek have not been surveyed since the mid-1980s. Activity histories for all sites are summarized below in Table 3-35, Goshawk activity history for the Lower Scott Watershed.

Table 3-35. Goshawk Survey History For The Lower Scott Watershed.

Activity Center	ID #	Activity History
S. Fork Mill Creek	#02	Nest w/young 1983 & '85, no response '92 & '96.
McGuffy Creek	#80	Birds seen 1982, no response 1992 & 1995.
Middle Creek	#04	Nest 1982, pair 1985, no response 1992 & 1995.
Isinglass Creek	#65	Pair 1980, 2 birds 1990, no response '92,'95,'96.
Boulder Creek	#81	Pair 1986, young '92 & '94, no response 1998.
Canyon Creek	#86	Adult birds seen 1987, not surveyed since.
Kelsey Springs	#08	Pair discovered 1994, occupied 1996.
Deep Lake Creek	New	Pair discovered 1997, occupied

		1997-1999.

Pacific Fisher: *Forest Service R-5 Sensitive*

This furbearer occupies late seral stage habitat in mature and old growth mixed conifer stands with a home range that can be very large (up to 11,000 acres in low quality habitat) (Region 5 Draft Furbearer Management Guidelines; CDFG, 1990). Fisher are generalized predators; they eat any animal they can catch and overpower, generally small- to medium-sized mammals and birds. They readily eat carrion and fruits. Fisher show a preference toward old-growth for denning.

Fishers do not appear to occur as frequently in early successional forests as they do in late-successional forests in the Pacific Northwest. While some recent work in northern California (including on the Scott River District) indicates that fishers are detected in second-growth forests and in areas with sparse overhead canopy, it is not known whether these habitats are used transiently or are the basis of stable homeranges. It is unlikely that early and mid-successional forests, especially those that have resulted from timber harvest, will provide the same prey resources, rest sites, and den sites as more mature forests (Ruggiero et al., 1994).

Large physical structures (live trees, snags, and logs) are the most frequent fisher rest sites, and these structures occur most commonly in late-successional forests. The maintenance of late-successional forests, and especially the habitat elements listed above, is important to the conservation of fishers.

Suitable denning, resting, and foraging habitat for fisher can be found in the analysis area. Many incidental sightings of fisher have occurred in the watershed, including in Singleton Creek (1983 and 1993), Coats Creek (1983), Boulder Creek (1989 and 1990), Jones Beach (1990), Canyon Creek (1991), Picnic Creek (1994), and Isinglass Creek (1999). Surveys using baited track plates and infrared camera stations have also been conducted throughout the watershed. Track and photograph detections of fisher have occurred in Canyon Creek, Boulder Creek, Deep Lake Creek, Singleton Creek, Kelsey Creek, and Gumboot Creek. Protocol surveys using methods described by Zielinski and Kucera (draft 1994, final 1995) were conducted in the entire Collins-Baldy LSR during the following seasons: October 1994 through March 1995, and November 1995 through February 1996. Survey of the LSR included over 40 camera and track box stations; detections of fisher occurred at 14 of the stations, including Singleton, Gumboot and Mill Creek drainages within the watershed.

American marten: *Forest Service R-5 Sensitive*

This species also uses mature and old growth habitat, but is considered to use habitat at a higher elevation than fisher. Generally, mature and over-mature true fir/hemlock/pine habitat occurring above 5,000 feet in elevation with a dense canopy (greater than 40%) and adequate large, CWM is considered marten habitat (Jameson et al., 1988; CDFG, 1990). However, they are not restricted to this habitat; mixed conifer at lower elevations is also considered suitable for marten.

American martens are limited to conifer-dominated forests and vegetation types nearby. In most studies of habitat use, martens were found to prefer late-successional stands of mesic coniferous forest, especially those with complex physical structure near the ground (Buskirk and Powell, 1994). Xeric forest types and those with a lack of structure near the ground are used little or not at all. The preference and apparent need for structure near the ground, especially in winter, appears universal (Ruggiero et al., 1994).

In northwestern California, a subspecies, *Martes americana humboldtensis*, may be Threatened or Endangered. The most likely cause of this hypothesized status is loss of habitat due to timber cutting in late-successional forests. The marten is predisposed by several attributes to impacts from human activities, including: its habitat specialization for mesic, structurally complex forests; its low population densities; and its low reproductive rate for a mammal of its size (Ruggiero et al., 1994).

The distribution of marten in the analysis area is not well known due to the lack of sightings or survey data. Mid- and high elevation mixed conifer habitat, considered suitable for marten, can be found in the area. Surveys, as described above, did not detect marten in the watershed. There have been two incidental sightings of marten recorded on the Scott River District, one on Boulder Peak (NE 1/4 of Section 15) in 1990, and one at Little Elk Lake Creek (NE 1/4 of Section 20) (no date).

Willow Flycatcher: *Forest Service R-5 Sensitive*

As a Neotropical migratory species, the willow flycatcher (*Empidonax trailii*) breeds in riparian and mesic upland thickets in the United States and Canada, wintering from Veracruz and Oaxaca, Mexico south to Panama (AOU, 1983). Breeding habitat in California is typically moist meadows with perennial streams, lowland riparian woodlands dominated by willows, cottonwoods, or in smaller spring fed boggy areas with willow or alders (Serena, 1982; Harris et al., 1987; Whitfield, 1990). The presence of water during the breeding season appears to be an important habitat component (Fowler et al., 1991). Willow flycatchers have also been found in riparian habitats of various types and sizes, ranging from small willow surrounded lakes or ponds with a fringe of meadow, to grasslands, to willow lined streams or boggy areas.

Habitat in the Lower Scott Analysis Area consists of riparian strips with willow or alder thickets and small patches of willows or alders in higher elevation montane meadows. In the Marble Mountains, willow patches have been observed in Lower Wright Lake, Second Valley, Deep Lake, Little Elk Lake, Red Rock, Sky High, Big Rock, Kelsey Creek, Turk Lake, and Packer's Valley. Meadows range in size from 2 to 20 acres with willow patches generally 5 acres or smaller. Within the analysis area, there are roughly 3,800 acres of natural shrub (in the EUI database) that are potentially willow flycatcher habitat. Habitats in the analysis area have been impacted by mining, grazing, homesteading, and to some extent by road building. Hydrologic events, such as floods, remove willow habitat for short periods of time, but willows quickly re-colonize suitable disturbed sites. The effects of cattle grazing on willow flycatcher habitat in the analysis area are more thoroughly discussed in the Canyon Creek Watershed Analysis (Klamath NF, 1996) and the Indian Creek/Deadwood/Middle Tompkins Allotments, Russell/Lower Scott Watershed Analysis Area (Klamath NF, 1996a).

Historical information on this species occurring in the Klamath Mountains is practically non-existent. Systematic surveys have only recently been conducted to determine local distribution of willow flycatchers on the Oak Knoll and Goosenest Ranger Districts of the Forest. Annually since 1994, a constant effort mist netting station has been run at the mouth of Seiad Creek (north of the analysis area) from mid-May through Mid October. This station has documented some preliminary sketches of use by willow flycatchers in the Seiad Valley area. Since 1994, 186 willow flycatchers have been banded. There is a pattern of seasonal fluctuations at the banding station throughout the breeding season, with the peak numbers being caught in the early summer and again in the late summer. Many of the late summer individuals are birds that hatched within the year, which indicates that breeding does take place nearby, possibly in the Marble Mountains, or in suitable habitat within the Lower Scott Watershed.

Systematic surveys have not been conducted to determine local distribution of willow flycatchers in the Lower Scott Watershed. However, two sets of surveys have been conducted in the Marble Mountain Wilderness Area, one in 1995 and one in 1997. In 1995, surveys found *Empidonax* flycatchers at Deep Lake and at Little Elk Lake; however, positive identification of willow flycatchers did not occur. In 1997, the Forest land bird monitoring program implemented a study of eight basins in the Marble Mountain Wilderness Area, within the Lower Scott Watershed the study included bird census stations in Upper Second Valley, Lower Second Valley, Wright Lake, Deep Lake, Sky High Lakes, and Big Elk Lake (Alexander and Johnson, 1997). Willow flycatchers were detected in only one location in the watershed, Deep Lake, and one location outside of the watershed, Tom's Valley. Detections occurred in meadows that were moderately grazed or ungrazed with shrub-dominated riparian areas (ibid), although the data set is too limited to draw conclusions on willow flycatcher use in the area.

Livestock grazing can affect willow flycatcher habitat by altering the vegetation and hydrology of montane meadows. Cattle utilize alders and willows for shade and infrequent browsing. Heavy browsing of willows by cattle can armor the plants making them less penetrable as hiding or nesting cover for songbirds. Willow branch browsing by livestock or wildlife has not been systematically measured in the allotments in the Lower Scott Watershed, but limited data from range allotment files (Scott River Ranger District) have shown heavy browsing (greater than 40%) or tunneling in at least four areas: Little Elk, Deep Lake, Big Rock, and Red Rock Creek.

Western Pond Turtle: *Forest Service R-5 Sensitive*

Western pond turtles have a wide geographic range and use a variety of habitats. In California, the current range is similar to the historical range; however, the range has been fragmented by human activities (grazing, agriculture, and urbanization) and some populations have been extirpated (Holland, 1991). Pond turtles are uncommon to common in suitable aquatic habitat throughout California. They are associated with permanent or nearly permanent water in a wide variety of habitat types, such as streams, pools, ponds, and lakes (CDFG, 1988). Pond turtles have been documented up to 6,600 feet in elevation, but the majority of populations are found below 4,500 feet (Holland, 1991). Habitat for pond turtles includes basking sites, such as partially submerged logs, rocks, mats of floating vegetation, or open mud banks. Food sources include aquatic plant material, aquatic invertebrates, fishes, frogs, and even carrion (CDFG, 1988).

Western pond turtles have been documented in the Klamath and Scott Rivers. Habitats that could support western pond turtles, within the Lower Scott Analysis Area, include intermittent streams, perennial streams, high elevation lakes (although likelihood is low), meadows, lower elevation ponds and pools, and slow moving riverine habitat along the Scott River. Within the watershed, pond turtles are commonly seen; they have been incidentally observed and reported by field crews in the following locations: McCarthy Creek, Kelsey Creek, Scott River Resort, Lighthill Mine, Johnson Bar, McGuffy Creek, and Swanson Gulch. Most observations occurred in the vicinity of the Scott River.

Survey and Manage Species

Red Tree Vole

There is some indication that the Oregon red tree vole *(Arborimus longicaudus*) may be found in northern California. This preliminary information needs further analysis before applying Survey and Manage Component 2 standards and guidelines for this species in California (Forest Service Memorandum, November 4, 1996). At this time, the Lower Scott Analysis Area is expected to be outside of the range of *A. longicaudus*; therefore, no surveys for this species are required for projects.

Red tree voles are restricted to forests west of the crest of the Cascade Mountains. They inhabit primarily mesic, old growth Douglas-fir forests, and sometimes can be found in sapling/pole, closed canopy forests, and in trees or stands composed of grand fir, Sitka spruce, white fir, or western hemlock (Biology and Interim Survey Protocol for the Red Tree Vole, September 1996).

There is little data confirming or disputing whether the Oregon red tree vole occurs on the Forest. According to Jameson and Peeters (1988), red tree voles are confined to a narrow region of humid coastal forests near the ocean. They do not venture into less humid areas of the interior, even where Douglas-fir may abound. This information would suggest that it is unlikely that red tree voles occur on the Forest or in the Lower Scott Analysis Area. However, recent surveys in Oregon have found red tree voles in the Applegate River Watershed, approximately 25 miles north of the analysis area (M. Broyles, personal communication, 1999). The recent detections were roughly the same distance inland as the town of Seiad.

In addition, an NSO pellet analysis, being conducted as part of an NSO radio telemetry monitoring study (Timber Products, 1998), found *Arborimus longicaudus* as far inland as the North Fork of Clear Creek, seven miles north of Fort Jones (east of the analysis area) (S. Farber, personal communication, 1999). The detection in Clear Creek is recent, and it has not been confirmed whether the animal was actually *A. longicaudus* or *A. pomo* (California red tree vole). A review of files on Scott River Ranger District located an analysis of 105 NSO pellets found at Gumboot Creek, Russell Peak, and Jackson Creek. The pellet analysis recorded *A. longicaudus* at all three sites (unconfirmed). Gumboot Creek is within the Lower Scott Watershed and Russell Peak is within two miles of the analysis area.

Bats

Forest Service Sensitive or Survey and Mange bat species that may be found in the analysis area include: fringed myotis, silver-haired bat, long-eared myotis, long-legged myotis, pallid bat, and Townsend's big-eared bat. While these bat species are associated with coniferous forests, they differ somewhat in their preferred roosting habitats. These preferences are based on whether they are colonial and to what degree.

The colonial roosting fringed myotis require the relatively roomy roosts found in caves, mineshafts, buildings, and crevices. The semi-colonial, silver-haired bat roosts and forms nursery colonies in caves, hollow trees, snags, buildings, crevices, and under bark. The long-eared and long-legged myotis also form nursery colonies, but tend to roost individually or in small colonies in crevices in buildings or rock, in snags and under bark. Caves and mine shafts are used primarily for night roosts, with trees probably being the most important day roosts. All these bats use echolocation to forage on insects. All forage over forest openings and bodies of water (USDA, April 1997).

Pallid bats use a variety of habitats, including grasslands, shrub lands, woodlands, and coniferous forests (Philpott, 1997). Pallid bats are most common in open, dry habitats that contain rocky areas for roosting. They are a yearlong resident in most of their range and hibernate in winter near their summer roosts (Zeiner et al., 1990). No surveys for bats have been conducted in the analysis area; it is unknown if pallid bats occur here.

Townsend's big-eared bats are typically found in low desert to mid-elevation montane habitats, although sightings have been reported up to 10,800 feet (Philpott, 1997; Sherwin, 1998). Habitat associations include desert, native prairies, coniferous forests, mid-elevation mixed conifer, mixed hardwood-conifer forests, riparian communities, active agricultural areas and coastal habitat types (Kunz and Martin, 1982; Brown, 1996; Sherwin, 1998). Distribution of this species is strongly correlated with the availability of caves and cave-like roosting habitat (Sherwin, 1998). No daytime roost surveys have been conducted in the Lower Scott Analysis Area. It is expected that this species occurs within the analysis area due to positive identification of Townsend's big-eared bats in abandoned mine adits less than 10 miles east of the area (Shasta View Mine). Townsend's have also been detected in several abandoned mine adits further south

(Hathaway Mine near Cedar Gulch and Facey Mine in Kangaroo Creek).

Potential roost habitat for bats in the analysis area includes: abandoned mine shafts in the Scott Bar and Mill Creek areas, large trees and snags, Marble Caves, abandoned buildings and, potentially, higher elevation bedrock or limestone formations that may have caves. The Marble Caves are included in a Forest-wide cave management plan currently being prepared on the Forest.

Very few surveys for bats have been conducted in the watershed. However, mist netting was conducted in the area in 1997 on the Scott River at Indian Scotty. Sensitive and Survey and Manage bat species that were identified at this mist netting station include fringed myotis, silver-haired bats, and pallid bats. Common bat species that were also identified include little brown myotis, Yuma myotis, California myotis, and big brown bats. A very uncommon species that was heard on the same evening was the spotted bat; this bat was not captured and positively identified in-hand, as were the others.

Nocturnal emergence surveys were conducted for bats in the Marble Caves area in 1999. Bat use was detected, but positive identification of bat species was not made.

Del Norte Salamander (Protection Buffer Species/Survey And Manage Strategy 2);

Siskiyou Mountains Salamander (Protection Buffer Species/Survey And Manage Strategies 1 And 2)

According to the literature, these two closely related amphibians are associated with deep, rocky substrates. They are terrestrial salamanders, having no aquatic life stage. Given that these species are not highly mobile, they tend to occur as isolated populations with little genetic interchange. Habitat relationships are not well understood and investigations are currently underway. The salamanders are dependent on cool, moist environments. They are found at or near the forest surface during rainy periods in the fall and spring. The presence of dense canopy closure may help to maintain optimum surface conditions. During periods of inhospitable environmental conditions (hot and dry, or freezing temperatures), the salamanders retreat below the forest surface, utilizing interstitial spaces provided by deep layers of rock and talus. Although populations have been located in young forested stands, increased abundance is associated with older forests (Welsh and Lind, 1995).

These two plethodon salamanders, Siskiyou Mountains salamander (*Plethodon stormi - PLST*) and Del Norte salamander (*Plethodon elongatus - PLEL)*, are similar in appearance with slight differences in physical characteristics that can be determined in adults only. Both salamanders are Record of Decision Survey and Manage species. The Siskiyou Mountains salamander is listed as threatened by the State of California.

These species are known to occur on the west side of the Forest. The Del Norte salamander is more widely distributed of the two, occurring primarily west of Grider Ridge (five miles west of the Lower Scott Watershed), along the western perimeter of the Forest (Happy Camp, Ukonom, and Salmon River Districts), to Cecil Creek on the South Fork of the Salmon River. The range of the Siskiyou Mountain salamander appears to be east of Grider Ridge, centered generally around Seiad Valley, with detections along the Klamath and Lower Scott Rivers.

The Seiad-Grider area is considered a range contact zone between these two plethodonids (S. Cuenca, personal communication, 1999). Historically, Siskiyou Mountain salamanders were known only within the Seiad and Bittenbender Creek watersheds. In 1995, surveys were conducted and new detections expanded the range across the Klamath River into the lower reaches of Grider Creek, then eastward into Mill (1997) and Collins Creeks (1998). Del Norte salamanders have recently been found in a wide variety of habitats and canopy conditions on the Six Rivers and western Klamath National Forests (K. Nickell, personal communication, 1999).

Within the Lower Scott Watershed, surveys conducted by Timber Products Company (S. Farber, personal communication, 1999) and Forest personnel (S. Cuenca, personal communication, 1999) have found Siskiyou Mountain salamanders in several locations along Mill Creek, above Hossick Gulch near Mill Creek, along the Scott River near Muck-a-Muck Creek, and at the Kelsey Guard Station across the Scott River from Kelsey Creek. Surveys in the watershed have not found Del Norte salamanders. Further surveys are needed, especially on the west side of the Scott River, to determine the overlap area, or dividing line, between the two species ranges.

Management activities in the analysis area that have affected suitable habitats for salamanders include mining, road building, rock quarry development, and timber harvest. These types of activities have affected habitats by directly disturbing talus habitats or by altering the microclimate surrounding the talus substrate.

The Klamath Province is a fire-adapted ecosystem that was historically characterized as having frequent (occurring every 8-15 years), light surface fires of predominately low and moderate intensity. It is expected that salamanders have evolved in this frequent fire ecosystem. Exclusion of fire in portions of the analysis area has resulted in changes to forest structure and species composition. Fire suppression has changed the fire regime from frequent, low intensity surface fires, to infrequent, but devastating, stand-replacing fires. Stand-replacing fires have occurred in the watershed in the recent past (1987); stand-replacing wildfires can extirpate isolated populations of salamanders. Reintroducing fire is an important component of ecosystem management. Adverse affects to individuals from light to moderate underburning will be offset by long-term habitat protection.

Mollusks (Survey and Manage Strategies 1 And 2)

The following habitat descriptions are from the Field Guide to Survey and Manage Terrestrial Mollusk Species from the Northwest Forest Plan, June 1999 (USDI, 1999). Very little is known about mollusks in the Lower Scott Analysis Area. No formal surveys have been conducted in the analysis area using the available protocols. Surveys will be required in the future for ground-disturbing activities according to Management Recommendations that are yet to be finalized.

Chace sideband* - *Monadenia chaceana
This species occupies lower reaches of major drainages, in talus and rockslides, under rocks and woody debris in moist conifer forests, in caves, and in shrubby areas in riparian corridors. Rocks and large woody debris serve as refugia during the summer and winter seasons.

The Chace sideband has been identified at the mouth of the Shasta River (approximately 15 miles east of the watershed) during a survey training class in 1999. It is likely that this species occurs in the Lower Scott Analysis Area.

Klamath (Church's) sideband* - *Monadenia churchi
This species is mainly found in limestone outcrops, caves, and talus slides, but also in lava rockslides, especially in riparian areas, and under nearby forest debris in heavy shade. Many sites around Shasta Lake are in brush and pine-oak woodland.

Recent surveys for timber sales have found Klamath sideband on the Salmon River Ranger District in several locations (roughly 15 miles southwest of the analysis area); a specimen was also found in 1999 on Scott River Ranger District in the Jackson Creek watershed (25 miles south of the analysis area), although positive identification has not been made at this time.

Yellow-based sideband - *Monadenia fidelis ochromphalus*
This species occupies stable riparian zones within semi-dry mixed deciduous and conifer forests, but not necessarily restricted to riparian zones. Late-successional forest with high canopy closure, a mixed conifer and hardwood component, and the presence of large, down woody debris or rock talus is considered optimum habitat. This species has been found under logs, in rocky areas, and on pine needle and oak leaf litter.

Surveys for timber sales have found this species are near the Salmon River (more than 15 miles southwest of the analysis area).

Klamath shoulderband* - *Helminthoglypta talmadgei
This species inhabits stable talus and rockslides in limestone substrates, especially near springs or streams. Trees and bushes appear to be important for shading and food, though deep shade is not necessary.

Surveys for timber sales have found this species near the Salmon River (more than 15 miles southwest of the analysis area).

Oregon shoulderband* - *Helminthoglypta hertlieni
Oregon shoulderbands are generally associated with, though not restricted to, talus and other rocky substrates. It is suspected to be found within its range wherever permanent ground cover and/or moisture is available. This may include rock fissures or large woody debris sites. This species is also adapted to somewhat dry conditions during a portion of the year.

Recent surveys have found this species at the mouth of the Shasta River (during a training class) and at Skeahan’s Bar along the Klamath River (10 miles northeast of the analysis area). It is likely that this species occurs in the Lower Scott Analysis Area.

Tehama chaparral* - *Trilobopsis tehamana
Tehama chaparral is usually associated with rocky talus. This species has also been found under leaf litter and woody debris on the ground within 10 meters of limestone outcrops.

One specimen of Tehama chaparral was located in the Beaver Creek drainage (near Deer Creek) roughly ten miles northeast of the analysis area. The specimen was not found in or near limestone.

Papillose Taildropper* - *Prophysaon dubium
The papillose taildropper appears to be strongly associated with hardwood logs and leaf litter on sites with relatively high shade and moisture levels.

Papillose taildroppers have been found in several locations on the Salmon River Ranger District (15 miles southwest of the analysis area), and have also been found in the Beaver Creek Watershed (roughly 10 miles east). It is likely that this species occurs in the analysis area.

Klamath Forest Emphasis Species, Species of Local Concern

Peregrine Falcon

Peregrine falcons (*Falco peregrinus)* were removed from the Federally Endangered species list as recently as August 25, 1999. Recommendations for managing de-listed peregrine falcons include monitoring of known sites for at least the next five years. There is one known peregrine eyrie within the Lower Scott Analysis Area at Indian Scotty.

Peregrine falcons primarily nest on large cliffs, usually near water. Peregrines begin nesting in February, and the young fledge in early summer. Peregrines hunt for birds over large areas and many different habitat types. Perches in prominent locations (high rocks, cliffs, and snags) are important to peregrines as observation posts in foraging, territorial defense, and reproductive behavior.

The Indian Scotty eyrie is located on a massive rock outcrop over looking the Scott River and above the Indian Scotty Campground. It has been monitored annually since 1979. Between 1979 and 1999, reproduction was confirmed 13 out of 20 years; the eyrie was confirmed "active" (at least one bird present) in all 20 years surveyed.

Potential habitat for peregrines within the Lower Scott Watershed that has not been surveyed exists in the Tom Martin Peak area and in the Red Rock Creek drainage. Field crews within a mile of Tom Martin Peak have seen peregrines.

Deer

Columbian black-tailed deer (*Odocoileus hemionus columbianus*) are common and abundant in the Lower Scott Analysis Area. Deer populations in the area are part of the Klamath Deer Herd (Scott Valley Subherd) (CDFG, 1986). The herd contains both migratory and resident Columbian black-tailed deer; the herd range area covers roughly 4,400 square miles. The habitat within the analysis area is both summer and winter range, and migratory deer move elevationally from winter range at lower elevations to higher elevation meadows for fawning.

Winter range for the Scott Valley subherd includes the valley foothills, Scott River Canyon, and the floor of Scott Valley. Specifically within the Lower Scott Watershed, winter range is found in the Scott River Canyon including Franklin Gulch, Middle Lick Gulch, Mill Creek and Wooliver Creek. Deer spend up to five months on winter ranges. During the fall and spring deer migrate through transitory ranges at mid-elevations on their way to winter and summer ranges. Summer range for the migratory deer of the Scott Valley includes high elevation montane meadows and surrounding forested stands. Summer range in the watershed is located in upper Tompkins Creek, the Scott Bar Mountains and the Marble Mountains. Deer spend approximately 4 to 5 months on summer ranges at higher elevations. Overall population size for deer in the area is unknown, data collected by the California Department of Fish and Game (CDFG), during annual road surveys in Scott Valley, show a decrease in deer populations, even in the last five years (T.Burton, personal communication, 2000). Deer in the watershed forage mostly in higher elevation openings in early to mid-seral forest habitats in summer during dawn and dusk periods of the day (Van sickle 1995). Late-seral forest habitats provide thermal cover in both summer and winter.

Migratory deer fawning areas include moderately dense shrublands intermixed with forest, dense herbaceous stands, higher elevation riparian, and mountain shrub habitats with available water and forage (CDFG 1990). Tall forbs, grasses, and shrubs, typical of upland habitats, provide forage and hiding cover for fawns. Fawning areas within the watershed, which have been identified by CDFG, include the upper reaches of Mill Creek, Little Elk to lower Canyon Creek, Lover's Camp to Sky High Lakes, Marble Valley, Deep Lake, Lower and Upper Wright Lakes, and Paradise Lake to Kelsey Creek. Other suspected fawning areas include higher elevation meadows such as Milk Ranch Meadows, Middle Creek Meadows, and riparian areas in the upper reaches of Middle and Tompkins Creeks.

Fire has played an important role in influencing the vegetation patterns within the analysis area. It is largely responsible for the mosaic of brush fields and hardwoods within the dominant coniferous forest zone. Deer populations have probably been influenced more by low and moderate intensity fire than any other factor since 1900 (CDFG 1989). More intensive and efficient fire suppression techniques have reduced the occurrence and acreage affected by natural lower intensity fire.

Timber harvest has been a more recent influence on the habitats within the analysis area. Logging first became an influence on wildlife habitat around the town of Scott Bar during the peak mining years. In other parts of the watershed logging was a relatively minor activity until 1950. Since that time, timber harvest operations have increased dramatically and have been an important factor influencing deer and other wildlife habitats in the area.

Black-tailed deer are both browsers and grazers. They prefer tender new growth of various shrubs (e.g. ceanothus and mountain mahogany), many forbs, and a few grasses (Wallmo 1978, 1981). Deer will forage from the ground surface into bushes and trees as high as they can reach. Deer will also dig out subterranean mushrooms (CDFG April 1990). Food preferences vary with season, forage quality, and availability. Forbs and grasses are important in spring and acorns are important in autumn where available. Various shrubs are critical in summer and winter.

Important escape cover for deer includes brushy areas and tree thickets. Vegetative cover is critical for thermal regulation in winter and summer. Deer frequent various aspects of habitat during the year to aid in thermal regulation (e.g., they use south-facing slopes more in cold weather, and north-facing slopes more in hot weather) (CDFG April 1990).

Impacts from cattle could occur on deer summer range with overgrazing, including competition for forage and loss of fawning and hiding cover. Competition for forage between deer and cattle is expected to be minimal due to selection of different plant species, deer preferring green leafage from woody plants and cattle preferring grasses and forbs. Some competition may occur for forbs during the growing season, and for forbs and grasses in late summer and fall as green foliage becomes less available. There are seven cattle grazing (range) allotments that overlap the watershed: Middle Tompkins, Scott Bar, Boulder, Red Rock, Marble Valley, Big Meadows, and Big Ridge. Key grazing areas in the watershed, that are monitored through condition and trend transects and utilization plots, have been meeting utilization standards from the Forest Plan with the exception of the Big Rock area in the Canyon Creek drainage (KNF 1996, KNF 1996a, V. Van Sickle personal communication, 2000).

The local office of the CDFG has developed a draft predictive model for deer habitat on the Forest. Although the model is draft, it is currently the only model available to predict where high quality deer habitat occurs in the analysis area. The source data used in modeling the habitat was derived from Fox, et al. 1997. Although the model has not been tested on the ground in the Lower Scott Analysis Area, a map was made to predict where the high quality forage and cover habitat may occur (available in the Lower Scott Analysis Area files located at the Forest Supervisor's Office).

Habitat polygons that were interpreted as potentially "high value" for the area include the following: *<u>high forage value</u> - high index forage areas between 0 and 210 meters from high value cover; and <u>high cover value</u> - high index cover between 0 and 390 meters of high value forage*. Using this interpretation, the high value habitat areas are very scattered across the analysis area, with few obvious concentrations of "high value" habitat pixels. The areas identified as having high *cover* value occur over 12% of the analysis area (roughly 10,600 acres). Areas with concentrations of high value cover pixels include: forested stands in the middle elevations in the Canyon Creek Watershed (including Boulder, Kelsey, Second Valley, and Little Elk Lake Creek), upper Mill Creek, and upper Tompkins Creek. The areas identified as high *forage* value habitat occur over roughly 11% of the analysis area (roughly 9,700 acres). Areas with concentrations of high value forage pixels include: the low country along the Scott River (especially the west side), Scott Bar Mountain, upper Tompkins, and high elevation meadows in the Marble Mountain Wilderness Area. Forage quality and availability can be improved by introducing an underburning regime in suitable forage areas relatively close to cover. Burning should be conducted during the most ecologically appropriate time of year (i.e. fall burns for most species).

In addition to available forage and cover, potential disturbance effects can be important in determining the quality of habitat for deer. Deer are sensitive to disturbance in areas of high road density. In the analysis area, this condition is most prevalent in the Canyon Creek drainage, on Scott Bar Mountain, in the Collins-Baldy LSR, in upper Tompkins Creek and in upper Middle Creek. The analysis area is popular for road hunting, deer hunting camps and road hunters are common in the fall and a high number of hunters have consistently been noted by District personnel in upper Tompkins Creek, Middle Creek, Wooliver Creek, Scott Bar Mountain, and upper Mill Creek. Road closures or decommissioning will improve habitat for deer and reduce disturbance in these high road density areas.

Elk

Roosevelt elk breed in open, brushy stands of many deciduous and conifer habitats with abundant water. They feed in riparian areas, meadows, and herbaceous and brush stages of forest habitats. Feeding consists of both grazing and browsing; they eat grasses, forbs, tender twigs and leaves of shrubs and trees, fungi, some mast, and aquatic vegetation. Roosevelt elk require mature stands of deciduous and conifer forest habitats for cover. Dense brush understory is used for escape and thermal cover. These habitats are particularly important on south-facing slopes for cover in winter. Roosevelt elk use uneven-aged forest stands that include old-growth, herbaceous openings, and water. These elk do not travel far from the cover of forest.

Elk habitat on the Forest has been modeled using the draft "Southern Oregon-Northern California Bioregional Domain Elk Habitat Index" (Dr. L. Fox, T. Burton, and R. Callas). The source data used in modeling the habitat was derived from Fox, et al. 1997. Although the model has not been verified on the ground in the Lower Scott Analysis Area, a map was made to predict where high quality elk habitat may occur (available in Lower Scott Analysis Area file). Habitat polygons that were interpreted as potentially "high quality" habitat for elk in the area included: *high forage value areas very close to cover, high forage value areas moderately close to cover, and moderate cover very close to high value forage.* Using this interpretation, the larger patches of habitat occur in upper Tompkins Creek, Scott Bar Mountain, Deep Creek, McGuffy Creek, Box Camp Mountain, and montane meadows in the Marble Mountains (Wright Lakes, Little Elk Lake, Red Rock, Sky High, Paradise Lake and Turk Lake).

Anecdotal information on elk use in the watershed is minimal, but several sightings of elk have occurred in the following locations: Buker Road (E1/2 Section 28), 11 to 15 animals in Packer's Valley (E1/2 Section 27), a bull shot at Paradise in 1999, and on Scott Bar Mountain (N1/2 Section 23) in October, 1999. In addition, the grazing permittee on the Big Ridge Allotment has reported 30-40 elk for the past two or three years on Big Ridge above Kelsey Creek and in the adjacent drainages to the west. These are likely animals from the reintroduced herds in Elk Creek or Horse/Middle Creeks.

An important factor in maintaining a healthy elk population in the analysis area is providing adequate calving habitat. Good calving habitat is found on gentle slopes with dense cover, down woody material, close to forage and away from roads or other disturbance sources (USDA, July 1998). Calving habitat has not been specifically identified for this analysis area. Determination of important calving habitat should be made on the ground as it is judged by attributes that are not described in the vegetation data base (i.e., dense cover, down woody material).

Competition for food and cover may occur between elk and livestock, although elk appear to avoid areas where cattle are present if other options exist. When no other options exist, elk will tolerate some cattle use (Christensen et al. 1993). Points of conflict are wet sites and gentle terrain with succulent vegetation. Season-long cattle occupation of these sites undoubtedly reduces their value to elk. It is expected that competition would occur in grazing allotments in the watershed if elk were to repopulate the area. However, at this time, competition between elk and cattle has not been documented in the area.

In addition to available forage and cover, potential disturbance effects can be important in determining the quality of habitat for elk. Studies have shown elk to be extremely sensitive to roads; this is mostly related to hunting pressure and high traffic. In areas where elk are hunted, open road densities greater than 2.5 miles per square mile can reduce habitat effectiveness by half (USDA, July 1998). In the analysis area, high road density is of concern in the following areas: Scott Bar Mountain, upper Middle and Tompkins Creeks, South Fork Mill/Singleton/Picnic/Gumboot Creeks, and Canyon/Kelsey Creeks. Current *total road density* in the analysis area is displayed on Figure 3-X. On the map, road density is grouped as 0 mi/mi², .1-1 mi/mi², 1-2.5 mi/mi², 2.5-4 mi/mi², and >4 mi/mi². Road closures or decommissioning will improve potential habitat for elk in high road density areas.

Bear

Suitable habitat for bear can be characterized as forest areas with a mixture of vegetation types or seral stages providing both cover and a variety of food in good abundance. Where the mixture of vegetative types is sufficient to provide food year-round within relatively small area, bear densities tend to be greater. Individual black bear will make movements of relatively long distances to take advantage of seasonally abundant foods such as acorns or manzanita berries (CDFG, 1992).

Major habitat types used by black bear in California, and in the analysis area, include coniferous forest types, montane hardwoods and mixed and montane chaparral. Forested types, such as the mixed conifer forest, which provide a variety of vegetative types such as chaparral, hardwoods and conifers, tend to support greater numbers of bear than do less diverse coniferous types such as pure stands of true fir. Mixed conifer forests also provide year-round habitat and are preferred denning areas, recent research has shown large snags and hollow trees to be preferred den sites (F.Schmalenberger, pers. com.).

Bear are abundant in the watershed (T. Weist and F. Schmalenberger, personal communication); sightings of this species are a common occurrence along roads, and during cross-country hikes.

Although no data on bears has been collected specifically in the Lower Scott Analysis Area, radio telemetry data has been collected on the Ukonom Ranger District for a joint study being conducted by CDFG and the Forest Service (Klamath Black Bear Study). Biologists working on the study have recorded black bear densities up to 9-12 bears per square mile. It is expected that densities are similar throughout this portion of the Klamath Mountains (F. Schmalenberger, pers. com.).

Turkey

Turkeys have been introduced on the Klamath National Forest and are uncommon permanent residents. They occur in local, scattered populations in Siskiyou County. Two subspecies have been introduced on the Forest, the Rio Grande and the Merriam's. Turkeys are found mostly in deciduous riparian, oak, and conifer-oak woodlands. They prefer large-tree stages with low to intermediate canopy, interspersed with numerous grass/forb openings, near water.

Turkeys are a species of local interest, both as a game species and aesthetically. Turkeys have been introduced in the watershed and are increasing in numbers. Sightings of turkeys by local residents or Forest personnel have occurred in the town of Scott Bar (1993), in Mill Creek (1994 and 1995), on the Buker Road (1999), the mouth of Tompkins Creek (no date), Panther Cove (20 to 30 on several occasions), and on Scott Bar Mountain on many occasions (release site). .

Habitat for turkeys in the analysis area includes riparian areas, oak woodlands, canyon live oak and agricultural or pasture lands along the Scott River, mouth of Tompkins Creek, Mill Creek, Scott Bar, and Scott Bar Mountain.

Plants

The Lower Scott Analysis Area contains known populations and habitat for eight plant species of concern. Table 3-36, Plant Species of Concern in the Lower Scott Analysis Area, lists the plant species and their special management categories.

Table 3-36. Plant species of concern in the Lower Scott Analysis

Species	Common Name
Allotropa virgata	Sugar stick
Ptillidium californicum	Fuzz wort
Cypripedium fasciculatum	Clustered lady-slipper orchid
Cypripedium montanum	Mountain lady-slipper orchid
Epilobium siskiyouense	Siskiyou fireweed
Eriogonum hirtellum	Klamath Mtn.
	buckwheat
Lewisia cotyledon var. howellii	Siskiyou lewisia
Trillium ovatum ssp. *oettingeri*	Salmon Mtn. wakerobin

Allotropa virgata - Sugarstick:

Allotropa virgata occurs in closed canopy, hardwood, pole, mature, and old-growth seral stages in forests ranging in elevation from 1,500 to 5,600 feet. *Allotropa virgata* is a clonal species that spreads by rhizomes. It is a non-chlorophyllous mycotrophic species requiring an association with a fungus and a chlorophyllous vascular plant. Buried, rotten wood, and a rich humus layer are important aspects of the habitat; probably because of the moisture retention and nutrients that these elements supply that maintain the associated fungi. Associated fungi are mycorrhizal species, most often on trees. The fungus, *Tricholoma magnivelare,* or North American matsutake, is such an example where mutulistic relationships occur between the mushroom, its host tree and sugarstick.

Within the analysis area, habitat is located wherever sufficient decaying wood and host trees are present. Remnant stands of late-seral forests and younger stands with sufficient large woody debris are present within Canyon, Tompkins and Kelsey watersheds and provide moderately abundant, well-distributed habitat for this species. Conifer plantations and areas where stand-replacing fires occurred in 1987 do not support habitat for this species. Older plantations and areas of natural regeneration within fire areas (e.g. the Kelsey Creek watershed) probably do not support populations, but have the potential to develop into suitable habitat as the young conifer stands mature.

Ptilidium californicum - Fuzz wort

Ptilidium californicum is a liverwort that grows on the bark at the base of medium to large sized conifers. Moist sites with high relative humidity favor the species. It is most often in closed canopy forests on the north aspect of tree boles where there is less evapo-transpiration stress. North aspect slopes and the bottom one-third of slopes tend to have more favorable habitat conditions than mid to upper slopes. Collections to date indicate the species is most common in the white fir zone and higher elevations. This is likely related to reduced evapo-transpiration stress at these higher elevations. The species is thought to be sensitive to fire, even those of low intensity. Propagation is by wind-borne spores, so there is potential for long distance dispersal.

Potential habitat for fuzzwort exists throughout the analysis area. Populations have been documented from the Canyon watershed.

Cypripedium montanum - Mountain lady's slipper orchid AND

Cypripedium fasciculatum - Clustered lady's slipper orchid:

These species inhabit generally shady sites within mature conifer forests. Habitat ranges from dry, rocky sites to moist seeps and streamsides on a variety of soil types and plant associations, at elevations of 1,500 to 5,500 feet. These species are distributed across all of the western states, but are not common within their range. Populations tend to be very small with relatively few plants. These sites occur most frequently within late-successional forests. This type of habitat is found scattered throughout the analysis area, primarily on more moist and shadier north slopes. Plants in this genus have a complex ecology in which they have underground fungal relationships with other plant species, and frequently obligate single-species insect pollinators. These biological and ecological factors are believed to account for their rarity and are the limiting factors in their reproductive success. Forest data indicates that these species may be found in stands that have been thinned or selectively cut, or near roads or trails (Barker, 1984). Other data suggests that populations in Oregon and Washington show decline when canopy removal and soil disturbance occur (Urban, 1981). The ecological relationship of this species with fire is not clearly understood. Some populations have been noted to survive low intensity fire, while other populations do not.

Within the analysis area, habitat is located wherever sufficient shade and host trees are present. Remnant stands of late-seral forests and younger stands with sufficient shading provide moderately abundant, well-distributed habitat for this species. Conifer plantations and areas where stand-replacing fires occurred in 1987 do not support habitat for this species. Older plantations and areas of natural regeneration probably do not support populations, but have the potential to develop into suitable habitat, as the young conifer stands mature. One population of each species has been found in the analysis area.

Epilobium siskiyouense - Siskiyou fireweed:

Siskiyou fireweed inhabits rocky, open ultramafic slopes above 5,000' in Siskiyou and Trinity Counties and southern Oregon. All known sites on the Klamath are in locations that are not frequented by livestock.

Within the analysis area, one population has been identified within the Second Valley area of the Marble Mountain Wilderness. The population is located on rocks and scree along a ridge.

***Eriogonum hirtellum* - Klamath Mountain buckwheat:**

Klamath Mountain buckwheat is endemic to northwestern Siskiyou County and southwest Oregon. It is restricted to bald serpentine and ultramafic outcrops or gravelly slopes and ridges from 2,000 to 5,500 feet in elevation. These areas occur on sites with little soil development in open areas within mixed conifer forests.

Known populations and suitable habitat for this species is located within the Tom Martin Peak and McGuffy Creek areas. These populations represent the most southeasterly distribution of the species. The species is restricted to the ridgeline and no roads or trails traverse the area. Other known populations are found north of the Klamath River in the Siskiyou Mountains.

Lewisia cotyledon var. howellii - Siskiyou lewisia:

This species ranges from the Siskiyou Mountains in southwest Oregon south to the Trinity Alps in Trinity County, and from the Marble Mountains west to the Siskiyou Mountains along the Humboldt/Del Norte county lines. It occurs at elevations from 1,500 to 6,000 feet and on all parent materials. The species is restricted to rock outcrops and associated talus slopes in openings within many different vegetation types. The species occurs in open, dry areas, and is not dependent upon shading from adjacent trees or shrubs.

Several populations have been located throughout the entire analysis area. All sites were located on very rocky habitat.

***Trillium ovatum* ssp. - Salmon Mountain wakerobin:**

Salmon Mountain wakerobin is endemic to mixed conifer forests between 4,000 and 6,400 feet elevation in the southern Klamath and southern Klamath and southern Cascade Provinces of Siskiyou, Trinity and Shasta counties.

Throughout its range, the plant is found in moist, shady places near seeps, along streams, and on flats where snowmelt concentrates in spring. It is found generally in heavily forested areas where white fir or red fir are present. Alder and yew are also common associates. Populations of this subspecies grow on soils of various parent materials, but northern exposures are favored. This species requires cool, shaded, and moist conditions during the summer months.

The two known locations within the analysis area are found in the Canyon Creek drainage within the Marble Mountain Wilderness.

Key Question #2 - What unique plant species or communities are found in the analysis area (either natural or human introduced)?

Aspen Stands

Small patches of aspen can be found in high elevation meadows in the Marble Mountains. These stands are unique in the area and contribute to the biodiversity of the Marble Mountains. The stands are located in upper Red Rock Creek, upper Sky High Valley, upper Big Rock Fork, Paradise Lake, and Upper Wrights Lake. Approximately 148 acres of aspen occur in the watershed, 93% of which are in a mature seral condition.

Aspen stands are clonal, reproducing primarily from root suckers. The young suckers are very palatable to cattle, deer and elk. Concentrated grazing can impede clonal development. Because individual trees are relatively short-lived (80-100 yrs), long-term persistent grazing can reduce the size of or eliminate stands. Cattle also are attracted to aspen stands as shaded resting areas within the meadow complexes. White fir is encroaching upon some stands. Fire effectively reduces conifer encroachment and stimulates aspen root suckering.

Botanical Special Interest Area

Lake Mountain Foxtail Pine - Although this area is outside the Lower Scott Watershed Analysis Area, its immediate proximity warrants addressing here. The ridgeline running southwest from the top of Lake Mountain is the southeast boundary of the Botanical Special Interest Area as well as the Watershed Analysis Area boundary. The Special Interest Area includes 100 acres and is the northern-most known location of Foxtail Pine. The forest can be described as a sub-alpine mixed conifer type with as many as six conifer species present. Western White Pine is the dominant species with lesser, but relatively equal amounts of Foxtail Pine, Shasta Red Fir, White Fir, Mountain Hemlock and Jeffrey Pine present. Such assemblages of high-elevation conifers are rare throughout California and are restricted to the Klamath-Siskiyou Mountains. The conifer canopy cover in the SIA is sparse, ranging from 10-30 percent. All conifer species are present in the regeneration layer indicating successful maintenance of the community. However, red fir and white fir dominate in the understory, compared to western white pine and foxtail pine dominance in the overstory. Mountain hemlock is found only in the understory. Foxtail pine regeneration is very sparse within the SIA, but outside the SIA on the north and east slopes of Lake Mountain regeneration appears more successful (approx. 50 individuals, 3-4 feet tall). The largest diameter foxtail pine measured was 48.5 inches DBH. A nearby western white pine of 37.5 inches DBH was calculated to be 385 years old (Ecology plot, 1998). It is not unreasonable to estimate the larger foxtail pines to be 500 or more years old. The shrub layer is of moderate cover, ranging from 20-40 percent, and is primarily composed of green-leaf manzanita, western serviceberry, ocean spray, mountain honeysuckle, and gooseberries. The herbaceous layer is of low to moderate cover (10-20 percent) and is comprised mostly of forbs with few grass or grass-like species. Common herbs include species of Angelica, Indian paintbrush, stonecrop, and anemone. The presence of serpentine fern and Lemmon's sword fern indicate the ultramafic (peridotite) nature of the soils' parent material.

The health of the stand appears low. Many trees representing all species and size classes have dead tops and/or numerous dead limbs due to the presence of white pine blister rust, which first entered the area in the 1930s (Davis, 1995). Stand condition has also been adversely affected by the drought years in the early 1980s and the 1987 wildfire, which initially killed 6-7 large foxtail pines, followed by the loss of 3-4 more individuals to insect damage in 1988.

Other influences on stand dynamics include cattle grazing and an active fire lookout on top of Lake Mountain with an access road on the east ridge. The amount of cattle found in the area is minimal due to limited foraging opportunities, but grazing effects have been noted. Trampling from cattle is significant on young tree seedlings struggling to survive in a sub-alpine environment of harsh soils. Personnel from the fire lookout place salt-blocks for deer and feed birds. These actions may increase browsing pressure from deer and disrupt population dynamics of nutcrackers, a bird species of unique importance to the dispersal of foxtail pine seeds. The fire lookout is also a source of litter (broken glass, old batteries) from days past.

Research Natural Areas

Marble Caves - The Marble Caves Research Natural Area (RNA) is located in the Marbled Mountain Wilderness Area. It occupies about 2000 acres, half in the Canyon Creek drainage and the other half within the Wooley and Elk Creek drainages. The RNA is the greatest single alpine cave resource in the United States. Additionally, it contains the greatest concentration of solution caves west of the continental divide. The marble within the Canyon Creek drainage is intensely karstified, and as a result, contains the vast majority of the caves in the RNA. To date, the Klamath Mountains Conservation Task Force, an affiliate of the National Speleological Society, has mapped over 31 miles of cave passage. The cave system is known to contain vertebrate fossils, including bones of timber wolf and mountain sheep, animals that no longer exist in the area. Similarly, fossils of weasels have been found in the caves enclosed in flowstone. The fact that many of the caves have vertical pit entrances has led to a situation where animals have either fallen into the caves or entered and been unable to escape. In the winter, snow often bridges over some of the openings, creating potential traps to large vertebrates. Accumulations of bones have been collected and identified by Pacific Union College in the past.

Systematic inventories of cave fauna have not been conducted, but it is likely that the caves contain endemic cave-adapted species of invertebrates. Numerous bat species utilize the caves, and preliminary bat surveys have been conducted. Since the cave system was formed prior to Pleistocene glaciation, sediments within them will shed light on the Pleistocene climate and possibly on the uplift rate of the Klamath Mountains. Research into these questions and the on-going solution processes of the marble are being conducted by San Francisco State University.

Key Question #3 - What exotic plants or animals occur within the analysis area (distribution/habitat)?

Some species currently inhabiting the analysis were not present in the area a few decades ago. These non-native or range expanding species include bullfrogs, brown-headed cowbirds, European starlings, Virginia opossums, and noxious weeds. These species were either introduced or have encroached on available habitat.

Bullfrogs

Native to the eastern United States, bullfrogs were introduced in California early in this century. Bullfrogs are now widespread and common. They occur in quiet waters of ponds, irrigation ditches, streams and rivers. Shoreline cover and shallow water are important habitats for adults and tadpoles (CDFG May 2, 1988). Adult bullfrogs are opportunistic feeders, taking both aquatic and terrestrial prey items. Invertebrates are the primary food of bullfrogs, but they also take fish, salamanders, frogs, toads, snakes, turtles, birds, and mice.

Bullfrogs are the largest frogs in California and they may prey on, or compete for food and space with, native amphibians with which they co-exist. It has been suggested that bullfrogs are responsible for the elimination of red-legged frogs from the floor of the Central Valley and adjacent Sierra foothills, and for the reduction in the range of the yellow-legged frogs (CDFG, May 2, 1988). Holland, 1991, suggests that bullfrogs are the most significant predator of western pond turtles.

Bullfrogs are common within the Lower Scott Analysis Area in slow-moving water along the Scott River, in natural ponds, and in agricultural or livestock ponds.

Brown-headed Cowbirds

Although the brown-headed cowbird is native to California, its range has expanded with human agricultural activities, livestock grazing, and with the change in forest structure through road building and timber harvest. Brown-headed cowbirds lay their eggs in the nests of other birds and their young are raised by host parents at the expense of the other nestlings. They are most common in riparian areas and have been linked with the decline of the willow flycatcher.

Mist netting operations in Seiad Creek have detected very few brown-headed cowbirds in the area over the past six years. During the 1997 Forest landbird-monitoring program in the Marble Mountain Wilderness Area, brown-headed cowbirds were detected at five stations in upper and lower Sky High (Alexander and Johnson. 1997). In the study, Sky High was described as a grazed; shrub limited meadow system with moderate grazing by recreational pack stock and late season cattle grazing (ibid.). This data set is not large enough to draw conclusions about cowbird use or potential nest site parasitism. It is expected that, with so few detections, cowbird parasitism is not a major influence on songbirds in this area.] - Step 5?

European Starlings

European starlings were introduced into the eastern United States at the turn of the century and had become common in northern California by the 1950s (Harris 1991). These birds aggressively compete with native cavity nesting birds such as bluebirds, nuthatches, swallows and wrens for nest holes and may be affecting population potential for the native species.

Opossums

Opossums were brought into Oregon as pets between 1910 and 1921 (Maser et al., 1981). They have recently expanded their range into most of California, Oregon and parts of Washington. Where they are found, opossums are often densely settled. Little is known about opossum distribution or density in the analysis area. Incidental sightings and road-killed animals indicate that opossums occur, and are increasing in numbers, in the analysis area.

Opossums are essentially nocturnal and will seldom be found in daylight unless disturbed. Opossums occupy riparian, moist woodlands, brushy habitats, wetlands, and agricultural and residential areas that provide abundant food and cover; they are less common in dense conifer forests and grasslands (CDFG 1990). Opossums lie up during the day in rocky crevices, hollow trees, logs, burrow or brush pile (Caras, 1967). They are scavengers and eat just about everything, such as: insects, birds' eggs, mice, moles, lizards, snakes, nestling birds, fruits, and vegetable matter (Caras, 1967).

It is unknown what the effects of this introduced species are in this analysis area; whether they displace other, native species, or whether they have an effect on native bird or amphibian populations.

Noxious Weeds

Noxious weeds and invasive exotic plants are an increasing threat to native ecosystems and the function of plant communities. Noxious weeds have traditionally been considered a range and agricultural problem in the western United States, but exotic plants are also a serious biodiversity issue, which is of significant importance to our resources values on the Forest. All ecosystems are vulnerable to invasion by non-native weed species, including rangelands, forests, grasslands, riparian areas and wetlands.

Aggressive weed species out-compete native plants for water, nutrients, sunlight and space, which in turn alters the composition, structure and function of the entire ecological community. Many weed species contain chemical compounds that prevent any other plant seed from germinating at the same site. Weed infestations can impact wildlife by reducing important food plants and modifying habitat characteristics.

The Forest Service currently has no process for designating plants as noxious weeds. Use of State and County noxious weed lists is the current practice. The State of California and the County of Siskiyou manage weeds by use of the same list (State of CA, 1996). The Forest has developed a draft noxious weed list based on preliminary information available from Siskiyou County and Forest sources (Klamath National Forest, 1998). Formal inventories for these species within Forestlands have not been conducted. Within the Lower Scott Analysis Area, two species of noxious weeds are known to occur, leafy spurge and Dyer's woad.

Leafy spurge (*Euphorbia esula)* is a noxious perennial weed of European origin found within the Scott River drainage. It occurs primarily in untilled, non-cropland habitat such as woodlands, roadsides and wastelands. It is tolerant of a wide range of conditions and may be found in rich, moist alluvial terraces or dry, nutrient-poor hillslopes. The plants tend to grow and spread most rapidly on coarse-textured soils (Selleck et. al. 1962). Once established it grows rapidly, crowding out other more desirable plants. Allelopathic effects have been noted as evidenced by bare ground and lack of other forbs in vicinity of dense populations. Leafy spurge is a prolific producer of seeds that have a high rate of germination and may remain viable for up to 8 years (Bowes and Thomas 1978). Leafy spurge can also spread rapidly and persist through adverse conditions by vegetative reproduction from crown and root buds.

Dyer's woad, or Marlahan mustard, *(Isatis esula)* is a native of Southeastern Russia and an herb of the mustard family, which has been cultivated as a blue dye and medicine since the 13th century. Much like leafy spurge, it has the ability to aggressively colonize large areas through the production of large quantities of seed containing allelopathic compounds and vegetative propagules. Unlike leafy spurge, seeds of Dyer's woad do not remain viable in the soil for long periods of time. Biennial growth is most common in our area, although it can grow as a winter annual also.

No formal weed control strategy has been developed on the Forest. Weed treatment has been accomplished by Siskiyou County in the past. With the issuance of the recent Invasive Species Executive Order, March 2, 1999, Federal Agencies are directed to address noxious weeds in all National Environmental Policy Act documents, and to fund and implement noxious weed control strategies.

Human Dimension

Roads

Key Question #1 - What are the current conditions and uses of roads within the watershed?

The analysis area contains approximately 354 miles of road. Under Forest Service jurisdiction, there are 236 miles of system road and 10 miles of non-system road, 25 miles of road under Siskiyou County jurisdiction, 94 miles of private road, and the State of California has no roads under its jurisdiction. Refer to Appendix-F Numerical Listing of Roads and Their Status, and see Figure 3-17 Current Transportation System, contained in the Map Packet located at the end of this document.

County road #7F01 provides primary access to the watershed and community of Scott Bar. Within the analysis area, this paved highway parallels the Scott River for approximately 25 miles.

The storms of 1997 and heavy rainfall in 1998 created significant impacts to the existing road system.
One hundred and nineteen sites within the analysis area were identified from 1997 storm damage, with damage ranging from complete washouts, major landslides, culvert replacements, to heavy maintenance projects. Presently 80% of the sites have been fixed and the other 20% are in various stages of the environmental analysis process. Because of the extensive nature of the damage, emergency funding (ERFO) was applied for and approved. Repairs are expected to be completed within six years. See Figure 3-18 - Storm Damage Sites, which identifies the 1997 storm damage road sites that are fixed and the ones awaiting decisions in the environmental analysis process.

The 94 miles of road under private jurisdiction provide access to residences and industrial forestlands. Those individuals maintain these roads.

Forest Service road maintenance is grouped into five maintenance levels. Level 5 roads are double lane pavement, maintained to provide a high degree of user comfort. Level 4 roads have paved or aggregate surface, and are maintained to provide a moderate degree of user comfort and convenience at moderate travel speeds. Level 3 roads have an aggregate surface, and are maintained for travel by a prudent driver in a standard passenger car. Level 2 roads are those roads maintained for use by high clearance vehicles such as pickup trucks. Level 1 roads are intermittent service roads not maintained for use. Temporary non-system roads are those roads on NFS which were constructed to provide access for a single use, such as to a mining claim, water source, disposal site, harvest unit, landing, etc. These roads are closed after use and are not listed or identified as part of the transportation system.

Road maintenance is accomplished through timber sale contract requirements, Forest Service road maintenance crews, and service contracts.

The following Table 3-37 Road Maintenance Level Mileage, displays miles of Forest Service Jurisdiction roads by Maintenance Level.

Table 3 - 37 Road Maintenance Level Mileage

Level	**Miles**
1 - Intermittent Service	64
2 - High Clearance Vehicles	109
3 - Passenger Car	52
4 - All Weather surface	9
5 - Paved, Double Lane	0
Temporary Non-System	10
TOTAL	244

Through the years many of the roads within the watershed area have stabilized and both cut slopes and fill slopes are vegetated. Often erosion is triggered by intense seasonal thunderstorms, however severe erosion problems associated with roads may be chronic, and generally can be traced to one or more causes (e.g., design of the road, road grades, surface type, soil type, road location, steepness of terrain, inadequate drainage structures, road location, lack of maintenance, or vehicle use during wet weather conditions.) See the "Hillslope Processes" section for more information on roads and their affect on watershed processes. Road surfaces in the watershed area vary with considerations of soil type, slope stability, steepness of grades, proximity to the stream courses, and patterns of use.

Forest Service system roads within the watershed area were constructed for administration of NFS. Public use has been allowed by the Secretary of Agriculture on most roads. Various travel and access management strategies are used within the watershed area to minimize resource use conflicts. These conflicts may include special wildlife considerations, erosion related water quality concerns, or public safety. Approximately 59% of the roads in the watershed area provide year round access, although snow frequently limits winter travel. Seasonal access is provided by 9% of the roads, and 32% of the roads have permanent closures.

The following Table 3-38 Travel Access Management Mileage, displays miles of Forest Service jurisdiction roads by access strategy.

Table 3 – 38 Travel Access Management Mileage

Travel Access Management Strategy	**Miles**
Year-Round Access	189
Seasonal Access	17
Permanent Closure 1/	38
TOTAL	244
1/ Includes Non-System Roads	

Road density in the analysis area varies from zero to greater than four miles of road per square mile. The average overall road density (all roads) for the entire analysis area (includes both National Forest and private lands) is 2.3 miles/square mile, which includes Wilderness, and 2.9 miles/square mile excluding Wilderness. The highest densities are located in the Scott Bar Mountains, upper Middle and Tompkins Creeks, checkerboard lands south of Mill Creek, and the area from the Scott River road to the Wilderness boundary between Canyon and South Fork Kelsey Creek. See Figure 3-15 Road Density, contained in the Map Packet located at the end of this document.) The road densities for individual subwatersheds are discussed and displayed in the "Hillslope Processes" section .

The following Table 3-39 Mileage and Road Density Acreage by Land Allocation, lists the miles of road and acres of road density by land allocation type.

Table 3 - 39 Road Mileage and Road Density Acreage by Land Allocation

Land Allocation	Miles of Road	Road Density Acres 1/ (miles/sq.mi.)				
		0	0.1-1.0	1.0-2.5	2.5-4.0	>4.0
Wilderness	N/A	18,200	1,150	410	0	0
Late-Suc. Res.	90	790	2,110	6,230	5,920	5,670
Sensitive species	0	180	90	70	10	0
RR	32	830	1,480	3,230	2,020	1,700
Scenic River	2	420	370	320	120	10
Retention	8	0	10	240	400	350
Rec. River	7	30	210	720	290	460
Partial Retention	66	1,480	2,730	5,180	3,330	3,900
General Forest	16	640	610	1,500	670	660
TOTAL/2	**221**	**22,570**	**8,760**	**17,900**	**12,760**	**12,750**
1/ Rounded to the nearest 10 acres						
2/ Total includes County roads						

An Access and Travel Analysis for the analysis area will be completed and included in this Ecosystem Analysis. The Analysis will evaluate each road for potential resource impacts to wildlife, streams, and fish and also determine the human need for access in terms of administrative, resource, and public use. The analysis will make recommendations for roads, which are candidates for maintaining existing management, decommissioning, seasonal or year-round closure, or restoration opportunities. These recommendations are preliminary and not final decisions until site-specific environmental analysis has been completed.

Key Question #2 - How does the current road system provide access outside the watershed?

Portions of the road system, which include County and Forest roads, provide critical access for local residents. The flooding of 1997 severely damaged the Deep Creek bridge making it impassable, thereby blocking primary access - County Road #7F01 (Scott River Road) for several months, necessitating the use of alternate routes. Several Forest roads provided emergency access into and out of the area. Listed below are brief descriptions of the roads that provide access in/out of the analysis area.

<u>County Road #7F01 Scott River Road</u> is the major transportation route, which bisects the analysis area in a northerly direction. It provides year round access linking Ft Jones to the Klamath River corridor and is the primary transportation route into and out of the area. For residents living within the watershed, it provides a critical link to the outside world for this somewhat isolated area.

<u>6G003B Mill Creek Road</u> is both a County (first 6 miles) and Forest road, which receives moderate local use. It provides access to the residences located in the lower portion of the drainage and recreational access during the summer months to the Collins Baldy Lookout and the Deadwood Baldy Lookout site as well as the Gunsight Peak road. It has also been used as an emergency route into/ out of the area when Highway 96 was blocked. It is used by recreationists (hunters, etc.)

East Tompkins Road (46N64, 46N65, 45N05Y) is a Forest collector road, which provides access from the Scott River road up and over Lake Mountain into the Klamath River drainage. It provides access to the Lake Mountain Lookout and the headwaters of Mill, Kuntz and O'Neil Creeks. It is used by recreationists (hunters, etc.).

Tom Walker Road (46N64) is a Forest collector road, which provides access from the Scott River road up and over Lake Mountain into Walker Creek of the Klamath River drainage. This road is currently inaccessible as a result of numerous landslides that have destroyed several sections of the road in the Walker Creek drainage (outside of the analysis area). The decision on whether to repair it or not has not been made.

Human Uses

Key Question #1 - What are the recreational facilities and uses in the watershed?

Recreational uses and facilities can be separated into two types; developed and dispersed.

Developed Recreation - Two campgrounds, both along the Scott River, are located within the watershed; they are Indian Scotty and Bridge Flat. Indian Scotty has 28 camping units and one group picnic site. Bridge Flat has five camping units. Both campgrounds are open year-round, but services and fees are only during the operational period of approximately May through October. Occupancy rates for the operational period average about 30% and 10% respectively. Jones Beach is a picnic site with a beach and swimming access along the Scott River. It is also open year-round but has a shorter operational period of about May to August, which is dependent on the water flow of the Scott River. Its occupancy rate is estimated at 20%.

Dispersed Recreation - This can be further separated into three types; 1) wilderness, 2) river, and 3) general.

WILDERNESS - A portion of the Marble Mountain Wilderness (19,715 acres) is located within the watershed. It is the heaviest used portion of this wilderness. It offers relatively easy access to several lake attractions and the namesake of the wilderness, the impressive Marble Rim. Access is provided by an extensive trail system including two National Recreation Trails, the Pacific Crest Trail (PCT) and the Kelsey Trail. This trail system is briefly discussed below:

Trails - There are about 60 miles of trails in or serving the wilderness in this watershed. Trail use can be divided into three basic types: 1) administrative, i.e. trail maintenance, fire suppression, range management, wilderness patrol, resource inventories; 2) recreational, i.e. public hiking, riding and packing; and 3) commercial, i.e. outfitters/guides, cattle range permittees. *Trail types* can be divided into three basic categories: 1) **Primary**, those trails accessing key destinations or providing main transportation routes and maintained annually; 2) **Secondary**, lower priority trails accessing general areas or shortcuts and maintained every one to three years; 3) **Inactive**, those trails that were part of the system at one time but now not maintained. Trail use mostly occurs from about May to October depending on snow and weather.

Trailheads - There are six wilderness trailheads in the watershed: 1) Boulder Creek, 2) Lovers Camp, 3) Box Camp Saddle, 4) Paradise, 5) Kelsey and 6) Tyler Meadows (also called Falkstein or Yellowjacket). Only Lovers Camp is developed with campsites, toilets and corrals, the others only have bulletin boards and parking areas.

RIVER - The bulk of the river use occurs on the Scott River and consists of rafting, kayaking and river play. The entire length of the Scott River in this watershed is a component of the National Wild and Scenic Rivers System; designated in 1981 for its outstandingly remarkable anadromous fisheries values. The river is classified as three sections: the upper portion (Shackelford Creek to McCarthy Creek) being "recreational," the middle section (McCarthy Creek to Scott Bar) is "scenic," and the lower portion (Scott Bar to Mouth) is "recreational".

Boating use generally occurs from April 15 to May 15 and is dependent on snow runoff. Use is both public and commercial but overall low compared to the Klamath River. There are four designated river accesses for boat launching: 1) Canyon Creek; 2) Bridge Flat; 3) Townsend Gulch; and 4) Johnson Bar. There are three other designated river accesses for foot access: 1) Tompkins Creek; 2) Gold Flat; and 3) Sugar Pine Gulch.

GENERAL - This includes such things as hunting, fishing, driving, photography, biking etc. These uses occur throughout the watershed generally from spring through fall. Winter recreational use is limited. The road system is an integral part of these uses. There are about 5 miles of system trails outside of wilderness that receive low use. Scenery as viewed from roads and trails is important to the recreationists' enjoyment of the area.

The relatively natural-appearing scenery of the area is a primary attraction to local residents and visitors to the

Forest. Sightseeing occurs along the Scott River road by both residents of the area and tourists. River recreationists also view the area while fishing or floating the river. Hikers view the area from hiking trails and from the Marble Mountain Wilderness.

From a visual management standpoint, sensitive travel routes have been identified. The level of sensitivity assigned to a travel route is an indicator of the level of interest people are likely to have in the surrounding landscape. The viewpoints (travel routes) are useful in assessing visual impacts of potential projects. The viewpoints and their visual sensitivity are listed below:

TABLE 3 - 39 Visual Sensitivity of Select Travel Routes, Roads, Trails, or Rivers.

Travel Route	Visual Sensitivity
Scott River National Wild & Scenic River	HIGH
Scott River Road	HIGH
Kelsey Creek National Historic Trail	HIGH
Marble Mountain Wilderness	HIGH
Bridge Flat Campground	HIGH
Indian Scotty Campground	HIGH
Lovers Camp Campground & access road	HIGH
Jones Beach	HIGH
Community of Scott Bar	HIGH
Lake Mountain Lookout	HIGH
Scott Bar Mountain Lookout	MEDIUM

High = primary or secondary travel way or use area with low to moderate use.

Source: 1998 Visual Sensitivity Levels map on file at the Forest Supervisors Office.

The area was inventoried for existing visual condition (EVC) levels in 1988 as part of the Forest Plan. The noticeability of management activities such as timber harvest, roads, and mining were interpreted using 1985, 1986, and 1988 aerial photos. Based on the broad scale of the analysis, large areas were identified, thus requiring further refinement at the project scale. This ecosystem analysis will refine this information in Step 5 of this process. The acres of EVC levels are displayed in Table 3-40 Acreage and Percentage by Existing Visual Condition Levels below and also see Figure 3-19 Existing Visual Condition, contained in the Map Packet located at the end of this document. This information is useful in comparing the existing visual condition to desired visual conditions (Visual Quality Objectives from the Forest Plan) to determine how close or far apart the watershed is from desired conditions. Opportunities for visual improvements can then be identified.

Table 3-40 Acreage and Percentage by Existing Visual Condition (EVC) Levels *

Visual Condition Level 1/	Acres	% Of Watershed
NATURAL APPEARING Untouched	44,700	60
Unnoticed	6,200	8
Subtotal	**50,900**	**68**
MODIFIED APPEARANCE Minor Disturbance	6,000	8
Disturbance	10,600	14
Major Disturbance	3,800	5
Drastic Disturbance	3,400	5
Subtotal	**23,800**	**32**
TOTAL	**74,700**	**100**

*NFS only - excludes private lands.
1/ Source - Forest Plan EVC data layer
NOTE: This information is general in nature and requires further refinement at the project scale.

The information in this table could be interpreted that 68% of the watershed is natural appearing to the average Forest visitor. On the other hand, 32% of the watershed has a modified appearance from past management activities, including timber harvest, roads, and mining.

The Forest recently completed an Accessibility Action Plan (9/99) and a Transition Plan (3/98). The purpose of these Plans is to provide accessible recreation facilities. The Transition Plan establishes legally required "minimum level" of accessibility to be offered at five select sites - to be completed by November 30, 2000. (None of the recreation sites within the watershed are identified in the Transition Plan for work in 2000.) The Action Plan identifies longer-term access needs, costs, and priorities for all sites.

Key Question #2 - What are the private land uses (include domestic water use)?

Private lands occupy 14,000 acres or 16 % of the watershed, with twelve percent industrial forest lands (3% Fruit Growers, 9% Timber Products) and 4% other private lands. Most of these lands are located primarily either along the Scott River corridor or as checkerboard lands in the Mill Creek area or northeastern section of the watershed.

Private land uses in the watershed consist of private residences, timber harvest from industrial forest lands as well as small timberland owners, mining operations, and local businesses (such as the Tompkins Creek Lodge).

Key Question #3 - What are the public and local community concerns and interests about this watershed?

The following concerns and interests are based on local knowledge of Forest Service employees living and working in this area, as well as comments received at Scott Bar public meetings, and conversations with local residents and land users. Local community concerns and interests include maintaining access to public and private lands for access to private residences, recreational residences under permit on NFS, opportunities for recreation (such as hunting, fishing, camping, driving, hiking) timber harvest on public and private lands and collection of forest products (firewood, Christmas trees, etc). Mining for locatable minerals (gold) has been an on-going activity in the watershed since it was first discovered in 1850. Much of the NFS in the watershed are under grazing permits to local ranchers. Vegetation and fire management (mainly suppression) is of interest to landowners as they are concerned about continual water quality in streams and water supplies to their homes.

Key Question #4 - What commodities are produced in the watershed?

Commodities produced in the watershed include timber from both public and private lands; gold; beef production (from range forage); water for domestic, agricultural, recreational and instream uses; other forest products, such as firewood, posts, poles, Christmas trees, berries, mushrooms, etc., for personal use; commercial outfitter and guides for horse packing into the wilderness, whitewater and fishing trips.

Timber: Approximately 24,600 acres or 33% of all NFS in the analysis area are available for timber management (also called Matrix lands). This is slightly higher than the Forest average of 21% matrix lands. There are five land allocations from the Forest Plan which provide for a long term sustained yield of timber harvest: Retention, Partial Retention, General Forest, Scenic and Recreational River. See Figure 1-2 Land Allocations. Partial Retention, General Forest, Recreational River comprise Regulation Class 2 lands, and Retention and Scenic River are Regulation Class 3. (See Table 3-41 Existing Acres of Matrix Lands By Management Area.) Regulation Class 2 lands provide for moderate timber yields and are lands, which co-emphasize timber management and other resources relatively equally. Regulation Class 3 lands provide for minimal timber yields and emphasize non-timber resources. The Klamath Forest Plan estimates a Probable Sale Quantity of 2.2 MMBF from the Lower Scott River watershed. This watershed analysis will refine the matrix land allocation acres and the estimated timber volume from available lands in Step 5.

Table 3-41 Existing Acres of Matrix Lands By Management Area 1/

Management Area	Acres	% Of Matrix Lands	% Of Analysis Area	Non-Capable Acres	% Non-Capable Acres
Scenic River	1,200	5	1	610	51
Retention	1,000	4	1	90	9
Recreational River	1,700	7	2	580	34
Partial Retention	16,600	67	19	4,280	26
General Forest	4,100	17	5	610	15
TOTAL	**24,600**	**100**	**33**	**6,170**	**25**

1/ Source: Ecological Unit Inventory data layer

The following Table 3-42 Acreage of Seral Stage for Matrix Lands By Management Area shows existing acres by seral stage by management area for matrix lands in the analysis area.

Table 3-42 Acreage of Seral Stage for Matrix Lands By Management Area 1/

Management Area	Shrub/Forb 2/	Pole 3/	Early-Mature 4/	Mid-Mature 5/	Late-Mature/Old-Growth 6/
Scenic River	10	10	510	670	40
Retention	50	140	410	300	100
Recreational River	40	30	740	790	110
Partial Retention	1,610	770	5,630	5,870	2,750
General Forest	210	190	980	1,420	310
TOTAL	**1,920**	**1,140**	**8,270**	**9,050**	**3,310**

1/ Source: Ecological Unit Inventory data sort
2/ Trees (if present) <6" dbh or trees not present
3/ Trees from 6-11" dbh
4/ Trees from 11-21" dbh
5/ Trees from 21-36" dbh
6/ Trees > 36" dbh
Note: The remaining matrix acres are identified as plantations, barren areas, or water.

The following Table 3-43 Existing Acres of Plantations for Matrix Lands By Management Area, displays acreage of plantations by management area and their respective percentage of the total management area acreage.

Table 3-43 Existing Acres of Plantations for Matrix Lands By Management Area 1/

Management Area	Plantation Acres 2/	Total Management Area Acres	Percent Of Management Area Total
Retention	150	1,000	15
Scenic River	0	1,200	0
Partial Retention	2,280	16,600	14
General Forest	520	4,100	13
Recreational River	50	1,700	3
TOTAL	**3,000**	**24,600**	**12**

1/ Source: LMP Vegetation data layer

2/ includes all plantations 1960-1993, as well as non-stocked plantations

Mining: Current gold mining activity in the watershed consists of commercial and recreational mining. Mining generally occurs as dredging along the watercourses, however there have been several lode and placer mining operations that occur in the watershed. The Lost Dutchman Mining Association, a private mining club, owns property at the mouth of the Scott River and their members mine along the Scott River. Another mining club, the New 49ers, has numerous mining claims along the Scott River. This club predominantly dredges, but several members have practiced high-banking mining techniques. Use occurs primarily from June thru September, as California State regulations close the Scott River and its tributaries to dredging the rest of the year. There are two areas that are administratively withdrawn from mining - the Scott Bar Ranger Station and the Gold Flat Ranger Station.

Grazing: There are four grazing allotments located entirely within the watershed and portions of two grazing allotments partially within the watershed. Grazing allotments encompass 29,885 acres, with the majority of the forage areas consisting of interspersed meadows at the higher elevations Livestock grazing permits are currently issued for these allotments to four ranching families whose bases of operations are out of Scott Valley. Cattle are maintained on the home ranches during winter and early spring and driven to the National Forest and dispersed into forage areas throughout the landscape during the summer; returning to the valley in the fall.

Water: Several creeks and springs in the area provide water for domestic use. Bill Berry Creek provides domestic water to the Scott Bar Water Association as well as several private residences in the community of Scott Bar. The Association is responsible for the maintenance and repair of the water collection, storage, and distribution system. The Forest Service is a member of the association. Peregrine, Boulder, and Kelsey Creeks also are domestic water sources.

Key Question #5 - What are the heritage resources (prehistoric, historic, and contemporary uses) of the watershed?

The Shasta, from prehistoric times to the present, continue to have cultural ties to the landscape within the Lower Scott watershed analysis. Villages were present along the Scott River from Fort Jones to Scott Bar. Seasonal hunting and gathering took place at higher elevations. A wide variety of plants including roots and bulbs were gathered for use in foods, housing, clothing, basketry materials, for medicinal purposes, and for spiritual use. When killing game, the entire body was efficiently used or preserved. Likewise, certain of these or other resources were used for spiritual use. Higher elevation areas may have been visited to fulfill certain aspects of spiritual and/or ceremonial traditions.

In 1983, the Shasta people became federally recognized as part of the Quartz Valley Reservation, which also includes the Karuk and Upper Klamath Indians. In 1994, the Klamath National Forest signed a Memorandum of Understanding (MOU) with the Quartz Valley Reservation to formalize processes of communication and improving relationships toward the common goal of wise land and resource management. As a separate entity, the Shasta Nation is also consulted as part of ongoing dialogues.

A relatively small portion of the watershed has been surveyed for cultural resources. This is due in part to the absence of management activities and the presence of wilderness land. Of the recorded sites within the watershed, 15 sites are prehistoric, 5 sites contain prehistoric and historic material, and 45 sites reveal evidence of historic use. A number of summer residence homes and one route of the historic Kelsey Trail are also within the analysis area.

Based on the significant number of historical sites recorded in the analysis area, most of these sites are associated with mining activities such as flumes, ditches, sawmills, structures, adits, tunnels, stamp mills, tailing piles, cemeteries, cabins, and businesses.

Land use within the analysis area, from early historic times to the present, includes grazing, timber management, fire management, mining, and recreational activities. Recreational gold dredging from Scott Bar area to the mouth of the Scott River continues to attract people seasonally. The high mountainous areas of the Marble Mountain Wilderness continues to play an important role for people who like camping, hiking, hunting, fishing, and horseback riding.

Key Question #6 - What is the current status of land adjustments within the watershed?

The arrangement of private, commercial and public lands in the watershed makes land ownership adjustments a viable option in some instances to resolve land management problems or take advantage of opportunities. Currently there is one Small Tract Case in process to resolve an encroachment on the Scott River and there is one proposed Land Exchange involving public lands in Mill Creek and private lands along the Klamath River.

Key Question #7 - What are the other administrative and special uses on NFS lands?

There are 43 permitted Special Uses on NFS within the watershed. These include: 16 waterlines; 1 cemetery; 2 signs; 7 roads/driveways; 10 recreational residents, 5 outfitters/guides, 1 pack station, 1 pasture, and several power line/telephone lines.

There is one easement - the Fiber Optics line.

Several power site withdrawals exist along the lower portion of the Scott River.

There are six dedicated recreation sites (encumbered lands), which include campgrounds and recreation residences: Jones Beach, upper Kelsey Creek, Canyon Creek, Horton Flat, Bridge Flat, and Spring Flat.

Wilderness

Key Question #1 - What are the human activities that may be affecting the physical wilderness resources?

The 1964 and 1984 Wilderness Acts authorized certain human activities that do not necessarily conform to the management goals of wilderness. These include: 1- public recreation, hiking, camping, hunting, fishing, etc.; 2- trails and signing allowing travel in the wilderness; 3- research; 4- grazing of permitted livestock and facilities needed for their management; 5- outfitting and guiding to serve public recreational needs; and 6- administrative facilities needed to manage various activities. All of these activities require some form of on site presence and may leave more than temporary evidence of their occurrence.

There is an extensive managed trail system in the wilderness used by the public, range permittees, outfitter guides and Forest Service administrative personnel to access the different areas and serve their different needs.

Presently, much of the wilderness has poorly posted boundaries.

Campsites are the most obvious sign of human use. They were inventoried and evaluated several years ago.

There is a large cave resource that is being identified and inventoried. The caves draw a lot of research and recreation use.

Several commercial outfitter/guides provide recreational services to the public.

Key Question #2 - What are the impacts from human activities that might affect the quality of wilderness visitors" experiences?

Noise, physical evidence of use and encounters of human and stock activities are the main concerns.

Key Question #3 - Is fire performing its natural role in the ecosystem?

Fire has been aggressively suppressed since the 1930s in this area, with some minor exceptions in the last few years where modified suppression actions were taken on small fires.

Because of the natural land forms and topography there are some areas resilient to fire disturbance. In other areas, there have been unnatural accumulations of fuel and increases in fire intolerant species, such as white fir in the understory.